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Forest
Service

United States
Department of the
Interior

Bureau of
Land Management

ENVIRONMENTAL ASSESSMENT for OIL and GAS LEASING in the ESCALANTE KNOWN GEOLOGICAL STRUCTURE (KGS)

DIXIE NATIONAL FOREST
CEDAR CITY DISTRICT, BUREAU OF LAND MANAGEMENT

GARFIELD COUNTY, UTAH

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OIL AND GAS LEASING
ESCALANTE KNOWN GEOLOGICAL STRUCTURE (KGS)

DIXIE NATIONAL FOREST
CEDAR CITY DISTRICT, BUREAU OF LAND MANAGEMENT (BLM)

GARFIELD COUNTY, UTAH

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Abstract

This Environmental Assessment considers alternative levels of oil and gas leasing and development within the Escalante Known Geological Structure (KGS) on the Dixie National Forest and Cedar City District of the Bureau of Land Management (BLM).

Issues and concerns include protection of surface resources, opportunity for mineral development, and reclamation of disturbed areas.

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ENVIRONMENTAL ASSESSMENT
OIL AND GAS LEASING
ESCALANTE KNOWN GEOLOGICAL STRUCTURE (KGS)

DIXIE NATIONAL FOREST
AND
CEDAR CITY DISTRICT, BUREAU OF LAND MANAGEMENT, BLM

I. PURPOSE OF AND NEED FOR ACTION

A. Current Situation

The Bureau of Land Management (BLM), which has the authority to issue oil and gas leases on Federal lands, has been requested to offer for oil and gas lease certain lands within the Escalante Known Geological Structure (KGS) near Escalante, Utah. Lands within the KGS are subject to competitive leasing in accordance with 43 CFR 3120. The BLM has requested recommendations from the Forest Service concerning unleased tracts of National Forest System (NFS) lands within the KGS. It has been determined that all unleased Federal lands that are available for leasing within the KGS will be considered in this Assessment. Those lands which are presently under lease will be considered for future lease action which may be taken upon expiration of the existing leases. The KGS contains approximately 80,000 acres of which 65,000 acres are NFS lands and 14,000 acres are BLM administered lands. There are also approximately 1,000 acres of State and private lands within the KGS. This Assessment will not address State or private lands.

The majority of the BLM administered lands within the KGS are designated as the Phipps-Death Hollow Instant Study Area (ISA) for possible future Wilderness designation. The processing of new leases within the ISA is currently prohibited by Section 307 of the FY 1986 Appropriations Act (P.L. 99-190). Although this Assessment may refer to the ISA, no further consideration will be given to issuing new leases in the ISA.

The Box-Death Hollow Wilderness is also located within the KGS. The Utah Wilderness Act of 1984 (P.L. 98-428) withdrew the Wilderness from further mineral leasing. Therefore, no further consideration will be given to issuing new leases in the Box-Death Hollow Wilderness.

Existing leases within the KGS cover approximately 23,659 acres. There are approximately 26,072 acres of unleased land available for leasing. The remaining 28,940 acres are classified Wilderness or Instant Study Area which are unavailable for leasing. Currently 8,135 acres are under lease in the Wilderness or ISA.

This Environmental Assessment provides disclosure of the environmental conditions and evaluates potential impacts from the leasing of the 26,072 acres of Federal lands available for leasing within the KGS. This document does not address site-specific operating plans since no plans have been submitted. This Assessment will address issues of concern which should be reflected in determining which areas should be leased and which stipulations should be applied to leases. The Assessment will describe existing surface resources and the human environment that could be affected if leases were developed, propose alternative levels of leasing and development, evaluate the effects of each alternative on the surface resources and human environment, and will recommmend acceptable mitigating measures which should be applied to individual leases under the selected alternative.

This Assessment will not address economic trade-offs between mineral resource and surface resource values because exploration of subsurface mineral deposits is done following leasing, and the quality and quantity of the reservoir are not yet known.

Site-specific proposals or plans of operations have not been submitted for approval. The site-specific impacts cannot be identified at this time because sufficient site-specific information is not available and it cannot be predicted when and where future actions might be proposed or occur. To attempt such an analysis at this time based on current information would be speculative and the analysis premature and inaccurate. When a proposal or plan of operations has been developed further analysis would be prepared to address the site-specific impacts including the cumulative effects of full field development and connected actions such as gas plants and CO_2 transportation pipelines. This staged environmental analysis approach would be utilized to evaluate the additive effects of the site-specific actions when sufficient information is available. This analysis would be used to determine if an individual well site, full-CO_2 field development, gas plant, etc., can be approved as proposed.

The National Forest System lands within the KGS are presently managed under the Aquarius and the Boulder Land Use Plans. The western two-thirds of the KGS is managed under the Aquarius Land Use Plan and is addressed in the Box-Death Hollow, Wide Hollow, Cowpuncher, and Jubilee Management Area portions of the Plan.

The eastern one-third of the KGS is managed under the Boulder Land Use Plan and is addressed in the Boulder Mountain Backcountry, Benchlands, and Canyon Lands Management Area portions of the Plan.

The Dixie National Forest's Land and Resource Management Plan will address resource use within the KGS. Since the Plan is in draft, management direction from the Draft Plan was not used in the preparation of this EA. However, recommendations in this EA are not in conflict with the objectives in the Draft Plan.

The BLM lands within the KGS are being managed under the Escalante Management Framework Plan. Mineral leasing under the Framework Plan is addressed by the District-Wide Programmatic Oil and Gas Environmental Analysis Record (EAR). The BLM lands in the KGS which are outside of the ISA and available for lease are classified as Category I and are recommended for leasing with standard stipulations. This recommendation also applies under this Environmental Assessment.

Legal constraints and restrictions which apply directly to the Escalante KGS at this time are:

1. No further leasing is allowed within the Box-Death Hollow Wilderness as set forth in the Utah Wilderness Act of 1984 (P.L. 98-428).

2. Carbon dioxide (CO_2) only may be leased in Antone Bench and Exclusion Areas 2, 3, 4, and 5; as designated by the Utah Wilderness Act.

3. The BLM is constrained from expending funds to process any new leases within the Phipps-Death Hollow Instant Study Area in accordance with Section 307 of the FY 1986 Appropriations Act.

4. Applications for permit to drill (APD's) and other operations requiring approval on existing leases will be processed in accordance with 43 CFR 3468 and Onshore Oil and Gas Order No. 1.

5. Leases issued within the Wilderness prior to the Utah Wilderness Act and leases issued in the ISA prior to the Federal Land Policy and Management Act (FLPMA) represent valid existing rights.

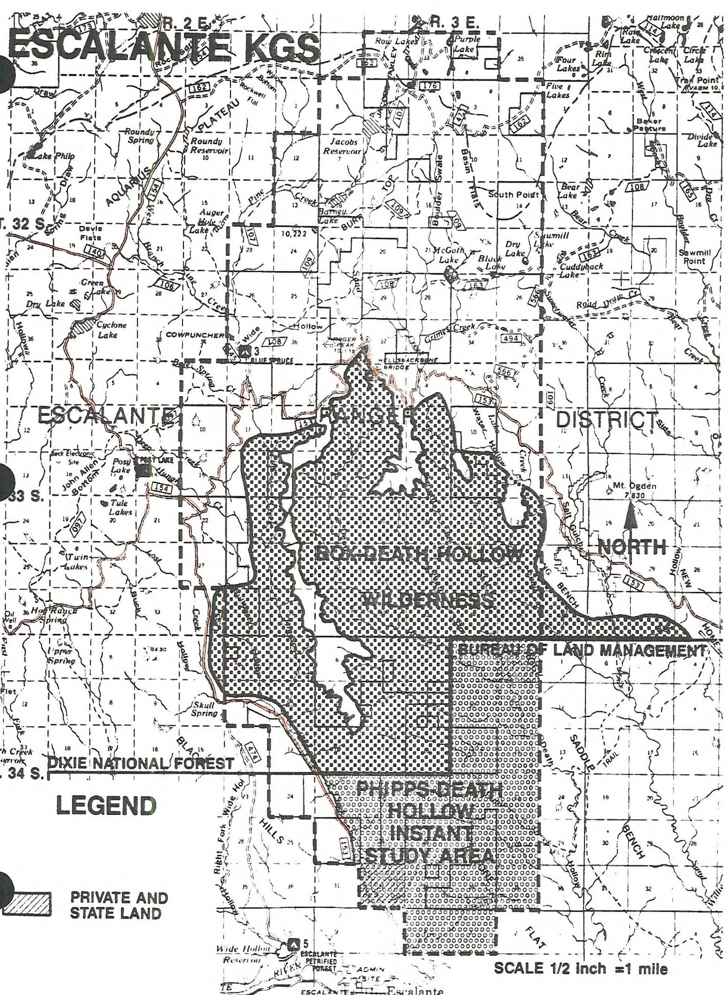
Existing leases (as of May 2, 1986) within the KGS are shown on the map on page 11.

The potential for developing an economical CO_2 field within the KGS is high because CO_2 has already been discovered in the KGS. It is assumed that current gas field development methods would be used to develop a CO_2 field within the KGS. These methods require access roads, pipelines, powerlines, drill sites, pump stations, and a dehydration-compressor station. The objective of this Assessment is to provide the decisionmaker with sufficient information on which to base recommendations for, or against, lease issuance and for stipulations to mitigate surface resource impacts where leasing is recommended.

B. Background

The Escalante Field was discovered by the Phillips Petroleum Company in 1960; however, due to mechanical problems the first well drilled was abandoned. An undefined KGS determination was made by the U.S.

Geological Survey (USGS) in 1961 which conservatively covered only a portion of the crest of the Escalante Anticline. In 1962, Phillips Oil and Gas Company drilled another well in Section 29, T. 32 S., R. 3 E., Salt Lake Meridian (SLM), Garfield County, Utah. Carbon dioxide was discovered and tested at 42 million cubic feet per day. This site was abandoned


ESCALANTE KGS
R. 2 E.
R. 3 E.
T. 32 S.
33 S.
T. 34 S.
ESCALANTE RANGER DISTRICT
BOX-DEATH HOLLOW WILDERNESS
BUREAU OF LAND MANAGEMENT
DIXIE NATIONAL FOREST
PHIPPS-DEATH HOLLOW INSTANT STUDY AREA
NORTH
AQUARIUS PLATEAU
Row Lakes
Purple Lake
Four Lakes
Rim Lake
Rain Lake
Halfmoon Lake
Crescent Lake
Circle Lake
Trail Point
Five Lakes
Baker Pasture
Divide Lake
Roundy Spring
Roundy Reservoir
Rockwell Flat
Lake Philo
Jacobs Reservoir
Boulder Swale
Basin Flats
South Point
Bear Lake
Bear Creek
Auger Hole Lake
Barney Lake
10,222
Pine Creek
Devils Flats
McGath Lake
Black Lake
Dry Lake
Sawmill Lake
Cuddyback Lake
Sawmill Point
Road Draw Cr.
Green Lake
Dry Lake
Cyclone Lake
Hollow
COWPUNCHER
Wide Hollow
BLUE SPRUCE
Roger Peak
HELLS BACKBONE BRIDGE
Grimes Creek
Bear Spring Cr.
Beck Electronic Site
John Allen Bottom
Posy Lake
POSY LAKE
Tule Lakes
Twin Lakes
Hog Ranch Spring
Oil Well
Upper Spring
Skull Spring
Mt. Ogden 7,830
Salt Gulch
BENCH
SADDLE
TRAIL
FLAT
Death Hollow
Right Fork Wide Hollow
HILLS
BLACK
Wide Hollow Reservoir
ESCALANTE PETRIFIED FOREST
RIVER
ADMIN SITE
Escalante
ESCALANTE
162
173
176
107
471
114
154
140
106
108
109
163
165
566
494
153
474
097
151
LEGEND
PRIVATE AND STATE LAND
SCALE 1/2 inch =1 mile

because no market for CO_2 existed at that time. Skyline Oil Company drilled farther down the Anticline in 1969. Records indicate flows in excess of 10 million cubic feet per day from that well. Again, the hole was plugged and abandoned.

The crest of the Escalante Anticline was designated a Known Geological Structure (KGS) by the U.S. Geological Survey in 1972. In 1984 the boundaries of the KGS were expanded to the encompass 80,000 acres of which approximately 65,000 acres are National Forest System lands and 14,000 acres are BLM administered lands. See map on page 5. The preceeding information was used to project the probability that CO_2 development of at least part of the KGS can be expected. No oil reserves have been discovered in the KGS to date. In accordance with the Utah Wilderness Act of 1984, no oil and gas leases can be issued in the areas identified in the Act as Antone Bench, Exclusion Areas 2, 3, 4, and 5, Box-Death Hollow Wilderness, or Phipps-Death Hollow ISA.

In 1983, Mid-Continent Oil and Gas Company drilled a well (Charger No. 1) in Section 29 of T. 33 S., R. 3 E., SLM, which further confirmed the discovery. Drilling records indicate flows in excess of 124 million cubic feet per day from Charger No. 1.

Since the time that Charger No. 1 was drilled, two other wells have been drilled by Mid-Continent Oil and Gas Company. Charger No. 2 and No. 4 encountered CO_2 in large quantities. Two other wells have been proposed (Charger No. 3 and No. 5). However, the Applications for Permit to Drill (APD's) have expired and the applicant would have to refile for approval in order to drill the wells.

C. Issues, Concerns, and Opportunities

1. Issues

The following issues were developed from the scoping process (Appendix D).

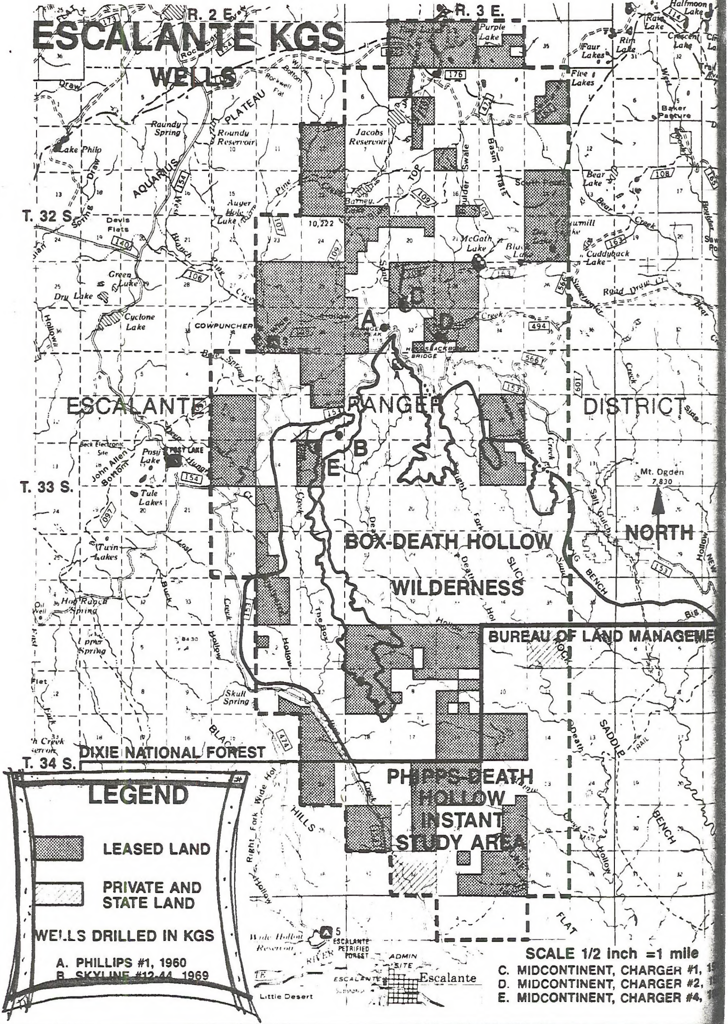
a. Should further leasing be allowed within the KGS?

b. What would be the effects of leasing or not leasing on the following under each alternative?

Cultural resources, fish, wildlife, threatened, endangered and sensitive species; surface and subsurface water quality and quantity; scenic values, and restrictions on the mineral industry.

c. Should surface disturbance be allowed in areas of low reclamation potential?

d. Should only CO_2 leases be offered in Antone Bench and Exclusion Areas 2 through 5 as provided in the Utah Wilderness Act of 1984?


ESCALANTE KGS
WELLS
R. 2 E.
R. 3 E.
T. 32 S.
T. 33 S.
T. 34 S.
ESCALANTE
RANGER
DISTRICT
BOX-DEATH HOLLOW
WILDERNESS
BUREAU OF LAND MANAGEME
DIXIE NATIONAL FOREST
PHIPPS-DEATH
HOLLOW
INSTANT
STUDY AREA
NORTH
A
B
C
D
E
AQUARIUS
PLATEAU
Mt. Ogden
7,830
Posy Lake
Escalante
LEGEND
LEASED LAND
PRIVATE AND STATE LAND
WELLS DRILLED IN KGS
A. PHILLIPS #1, 1960
B. SKYLINE #12-44, 1969
C. MIDCONTINENT, CHARGER #1, 1
D. MIDCONTINENT, CHARGER #2, 1
E. MIDCONTINENT, CHARGER #4, 1
SCALE 1/2 inch =1 mile

2. Concerns

Leasing could lead to surface disturbance through exploration and development. Surface disturbance would create the following concerns:

a. Geologic Stability
Discussion: What impacts would occur as a result of exploration or drilling activity on the identified geologically sensitive areas?

b. Wildlife
Discussion: What impacts would occur to wildlife habitat, security areas, or other wildlife qualities?

c. Visual Quality
Discussion: What impacts would occur to unique visual qualities in the KGS?

d. Dispersed Recreation
Discussion: How would dispersed recreation in the KGS be affected?

e. Cultural Resources
Discussion: What cultural resources now exist in the KGS? Could they be protected?

f. Water Quality and Quantity
Discussion: How would the quality and quantity of surface and subsurface water and the integrity of dependent fisheries be protected?

g. Sensitive Plants
Discussion: Sensitive plant species exist around Hells Backbone Bridge. How would they be protected?

3. Opportunities

a. CO_2 has been proven to be a valuable resource for use in enhancing oil recovery. Carbon dioxide has other uses including the production of dry ice and chemicals and as a carrier for coal in pipelines. Development of a CO_2 field could result in increased oil recovery from oil fields in other parts of the country that may otherwise be lost, thereby adding to the gross National product.

b. Exploration and development would improve local employment and increase the tax base for Federal, State, and local governments.

c. CO_2 development would result in a developed or improved road system which would meet the objectives for recreation and other resource needs.

D. Policy and Direction

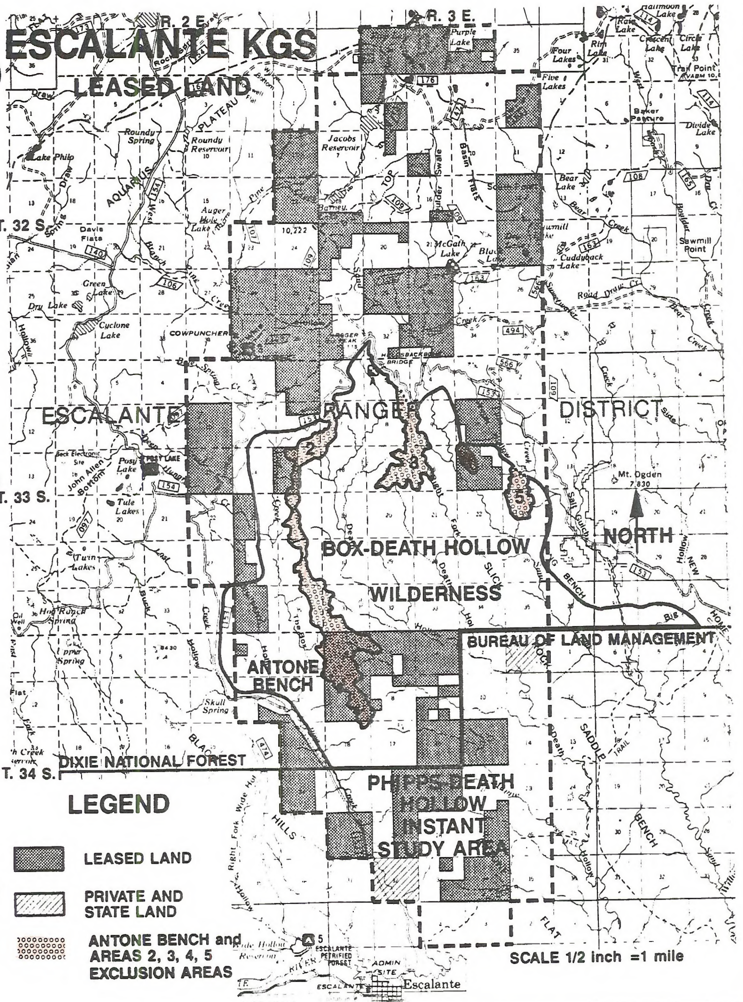
The Forest Service considers mineral exploration and development important parts of its management program. It cooperates with the Department of the

Interior through the BLM in administering exploration and development of leasable minerals on NFS lands. While the Forest Service is responsible for surface resource management and protection, it recognizes that mineral exploration and development are in the public interest and can be compatible, in the long term if not immediately, with the purposes for which the National Forest System lands are managed.

The Mineral Leasing Act of 1920 authorizes the Secretary of the Interior to issue leases and permits without the consent of the Secretary of Agriculture. Thus, the Forest Service has no statutory responsibility for issuing or supervising prospecting permits or leases on NFS lands. Under the Organic Administration Act (16 U.S.C. 551) the Secretary of Agriculture is authorized to make such rules and regulations as are needed to govern the use and occupancy of the National Forests, and to assure their preservation. By agreement with the Department of the Interior, the Forest Service reviews permit and lease applications and makes recommendations to protect surface resources and to prevent conflict with other activities, plans, and programs of the Forest Service and its users.

A mineral lease grants the right to extract and dispose of a specific mineral or minerals in lands covered by the lease subject to various terms, conditions, and stipulations. A mineral lease also grants a right to use the surface of the leased lands for the production of the specific mineral. Improvements necessary for operations, such as roads, pipelines, and powerlines may be constructed.

Dean Rowell


ESCALANTE KGS
LEASED LAND
R. 2 E.
R. 3 E.
T. 32 S.
T. 33 S.
T. 34 S.
ESCALANTE RANGER DISTRICT
BOX-DEATH HOLLOW WILDERNESS
ANTONE BENCH
BUREAU OF LAND MANAGEMENT
DIXIE NATIONAL FOREST
PHIPPS-DEATH HOLLOW INSTANT STUDY AREA
NORTH
Mt. Ogden 7,830
Purple Lake
Four Lakes
Five Lakes
Rim Lake
Rain Lake
Halfmoon Lake
Crescent Lake
Circle Lake
Trail Point
Baker Pasture
Divide Lake
Bear Lake
Sawmill Lake
Cuddyback Lake
Sawmill Point
Road Draw Cr.
Bear Creek
McGath Lake
Blue Lake
Jacobs Reservoir
Roundy Spring
Roundy Reservoir
Lake Philo
AQUARIUS PLATEAU
Auger Hole Lake
Davis Flats
Green Lake
Dry Lake
Cyclone Lake
COWPUNCHER
RANGER PEAK
HORSEBACK BRIDGE
Posy Lake
POSY LAKE
Beck Electronic Site
John Allen Bottom
Tule Lakes
Twin Lakes
Hog Ranch Spring
Oil Well
Skull Spring
The Box
BLACK HILLS
BIG BENCH
SADDLE
FLAT
ESCALANTE PETRIFIED FOREST
ADMIN SITE
ESCALANTE RIVER
Escalante
10,222
LEGEND
LEASED LAND
PRIVATE AND STATE LAND
ANTONE BENCH and AREAS 2, 3, 4, 5 EXCLUSION AREAS
SCALE 1/2 inch =1 mile
2
3
4
5

II. Alternatives

A. Formulation of Alternatives

The following alternatives will be evaluated in this Environmental Assessment.

Alternative I - Offer no new leases, but evaluate development of existing leases.

Alternative II - Offer new leases for CO_2 only within Antone Bench and Exclusion Areas 2-5.

Alternative III - Offer new leases for oil and gas and CO_2 within the area of greatest potential for development.

Alternative IV - Offer new leases only for oil and gas within those areas available for oil and gas leasing.

*Alternative V - Offer new leases for all lands within the KGS that are available for leasing.

Each alternative includes a different level of leasing and an assumed level of exploration, development, and production operations that that individual alternative could potentially support if adopted.

Alternative I addresses the development of only those lands already under oil and gas lease within the KGS. This alternative provides the base level of development if only existing leases were to be developed and if no further leasing were to take place at this time. Adoption of any one of the remaining alternatives would be made after considering the potential additive effects to Alternative I that additional leasing would have. These alternatives provide the line manager with different options based on the expected level of development and associated impacts that would occur if an alternative were chosen.

Since no site-specific plans or plans of development for a CO_2 field have been submitted to date, the development scenarios for each alternative are based on available information concerning the mineral resources within the KGS, past drilling in the KGS, and other information concerning oil and gas field development.

B. Other Alternatives Considered But Eliminated:

1. Defer action or recommendations relative to leasing until the Forest Land and Resource Management Plan is approved. This alternative was not considered further because Regional direction and the Interagency Agreement between the BLM and Forest Service require that response to all lease offers be made in a timely manner.

2. Formally amend the Aquarius and Boulder Land Use Plans to provide for lease evaluation and recommendations. This would be time consuming and the amendment would only be in effect until the Forest Plan has been completed.

* Alternative Requested by Gov. Task Force.

C. Situations Common to All Alternatives

Prior to the offering of any competitive leases under Alternatives II through V, each proposed lease tract would be reviewed and evaluated independently for conformance with this Environmental Assessment and the Forest Plan (if it is in effect at that time). It would also be reviewed for application of special stipulations in accordance with the criteria contained in the matrix found in Appendix A. This review could result in a recommendation of lease issuance with special restrictive stipulations applicable to all or part of the leasehold. All oil and gas leases would be issued on the standard lease form contained in Appendix B. CO_2 leases would be issued on the standard lease form modified to authorize the development and production of CO_2 only.

There would be no new leases issued in the Box-Death Hollow Wilderness nor in the Phipps-Death Hollow Instant Study Area. Where existing leases expire or terminate in the Wilderness and ISA (depending on the ISA being designated Wilderness or not), the lands included in these leases would not be reoffered for lease.

All proposed drilling and other operations and related surface disturbance conducted under the terms of a lease must be approved by the BLM before such activities are conducted. All approved operations would be in accordance with (1) lease terms, (2) 43 CFR 3160, (3) Onshore Oil and Gas Order No. 1, and (4) other onshore oil and gas orders, applicable Notices to Lessees (NTL's), and subsequent orders of the authorized officer. No drilling operations or related construction can be conducted without an approved application for permit to drill (APD). An APD consists of a drilling plan which includes a surface use program and a drilling program. The detailed information required to be submitted under each program is found in Onshore Oil and Gas Order No. 1. An onsite inspection of the proposed well site, road location and areas of other proposed surface uses is normally conducted. The Inspection Team would include BLM and Forest Service representatives (when National Forest System lands are involved), the lessee or his designated operator, operator's principal drilling and construction contractors and archaeologist, and other interested parties. The purpose of the onsite inspection is to identify problems and potential environmental impacts associated with the proposal and the methods for mitigating those impacts, including reclamation of disturbed areas, construction methods to be employed, and adjustment of the proposed well site and road locations. The BLM, with assistance of the Forest Service on National Forest System lands, prepares an environmental assesssment for each proposal.

Other proposed activities that involve surface disturbance that are not associated with drilling a well must also receive advance approval under the same procedures.

Carbon dioxide was discovered in the Escalante Anticline in 1960. Further exploratory drilling from that time to the present has confirmed the presence of CO_2 and led to the designation of the present KGS. See map of the KGS on page 8. Definition of the Anticline structure will continue as drilling progresses and further adjustments in the KGS boundaries could be made. Based on current drilling information, CO_2 wells in the KGS are

expected to be low pressure, but high volume wells. No production history has been established and reservoir characteristics still need to be established. The deposit has not been developed to date because of lack of a suitable market. Recent technology utilizing CO_2 as an injection media to enhance oil recovery from old oil fields has increased interest in CO_2. Recent interest has been expressed in developing and marketing the Escalante CO_2 deposit. The CO_2 resource has been projected to underlie the entire KGS and development of a commercial CO_2 field has been projected to occur within the next ten years. However, the present climate of declining oil prices would affect the profitability of any capital outlay needed to transport the CO_2 and to install CO_2 oil recovery systems within oil fields at this time. Economics as well as securing a firm market for the CO_2 may slow or delay development of a commercial CO_2 field within the Escalante KGS.

Generally, a gas field will progress through five basic phases: (1) preliminary investigations, (2) exploratory drilling, (3) development, (4) production, and (5) abandonment. The Escalante CO_2 field is currently undergoing exploratory and development drilling. It remains to be determined through drilling if sufficient reserves and production of CO_2 can be established and maintained to support commercial development of the field. Further exploration and development drilling and production can be expected to occur at the same time throughout the life of the field. The life of the field cannot be predicted at this time. The lapse time between production and abandonment of a field may be 15 to 20 years or longer.

The development of a CO_2 field would be limited by market demands, topographic limitations, CO_2 reservoir characteristics, and other factors. The level of development that would occur within the KGS cannot be accurately predicted. However, development of a field usually expands outward from existing shut-in wells. Therefore, the entire area currently available for development would be examined for potential impacts although it cannot be logically assumed that the entire KGS would be developed at the same time.

A well spacing pattern must be established to determine the spacing unit assigned to each well before development drilling can proceed. Well spacing patterns are established by the State of Utah to provide for the orderly development of the CO_2 reservoir, to avoid drilling unnecessary wells, to protect the lessees' rights, and to insure conservation of the resources. No spacing pattern has been established for the Escalante KGS to date. Gas well spacings in the United States range from 40 to 1,440 acres per well; however, it is anticipated that this CO_2 field would be developed based on a 640-acre well spacing pattern or 1 well per square mile. The 640-acre well spacing pattern is considered the standard spacing for gas field development. Although the field could possibly be developed on alternate spacings of 320 or even 160 acres, it was not considered economical to drill that many wells for CO_2 field development. Well spacings greater than 640 acres would probably not maximize economical resource recovery.

Surface use in the CO_2 field may be affected by the unitization of the leaseholds by the lessees. The lessees, by entering into a unit agreement, provide for (1) the development and operation of that field as a single,

consolidated unit without regard for separate leases, and (2) allocation of costs and benefits according to the terms of the agreement. Unitization would require BLM approval. Development under an agreement reduces surface impacts by avoiding duplication of field processing equipment and facilities and the need for additional protective wells. Development under a unit agreement may result in fewer wells needing to be drilled. No unit agreement between the lessees has been finalized to date. One or more unit agreements may be entered into in the KGS. Upon unitization of all or any part of the KGS a plan of development for the area would be required which would be subject to further environmental analysis and mitigation of site-specific impacts.

Upon approval of the application for permit to drill (APD), construction of the access road and well site could begin. The well site would be cleared of vegetation and a level pad would be constructed to accommodate the drill rig, mud pumps, reserve pit, generators, pipe racks and tool house. A small-to-medium size drill rig may be utilized to drill CO2 wells because of the relatively shallow drilling depths, 1,300 to 4,200 feet. A two-acre drill pad would be required to accommodate the size of drill rig expected to be utilized. Because of the shallow drilling depths and unless water flows are encountered, a relatively small reserve pit would be required to accommodate the drilling fluids and cuttings from the well. Drilling would be done by conventional methods or possibly by utilizing an air-foam system that would require a minimum amount of drilling water. Drilling water would need to be acquired off Forest and trucked to the drilling site. An estimated 60 to 70 truck loads of drilling water would be required to drill each well assuming 100-barrel capacity trucks and conventional drilling methods were employed. Additional traffic to the well sites would be generated by service companies delivering supplies and equipment to the well sites and by the shift changes of the drilling crews.

The time needed to drill a CO_2 development well to a total depth of 4,200 feet would normally be 1-3 weeks. The greatest amount of human, vehicular, and equipment activity and accompanying noise, etc., would occur during drilling activities. However, there would be continuous activity at one or more of the drill sites during the development of the field. The number of drill rigs operating at any one time would depend on how fast the field would be scheduled for development. The rate at which field development would occur cannot be predicted at this time.

Hydrogen sulfide (H_2S) is commonly encountered in oil and gas drilling and production and has been encountered associated with the CO_2 during the drilling of several of the wells. It is anticipated that future drilling would also encounter H_2S. Hydrogen sulfide is extremely toxic, heavier than air, and odorless in harmful concentrations. Hydrogen sulfide is also highly corrosive to metal and causes hydrogen embrittlement especially in high strength steel which would lead to failure of the metal. Metal equipment would have to be lined with special materials to avoid direct contact with the H_2S. There is insufficient information at this time as to the extent or potential concentrations of H_2S to fully evaluate the hazards.

CO_2 being heavier than air, could also create hazardous conditions if it escapes in quantity. CO_2 would displace air in low lying areas and the dangers of suffication under these conditions would be a potential hazard.

The operator would be required to seal off, protect, and isolate fresh water zones during and after drilling.

After the well is drilled steel casing would be installed inside the surface casing used for drilling and cemented in place. The producing zone may be hydraulically fractured or treated with diluted hydrochloric acid to increase the permeability and stimulate CO_2 recovery from the well. The drill rig and support equipment would be removed after the casing is cemented and the producing zone treated. CO_2 wells are expected to produce by normal flow and would not require pumping. Wellhead pressures of the CO_2 are expected to be approximately 100 psi (pounds per square inch). The possibility of a well blowout occuring during the development of the CO_2 field cannot be discounted considering the number of wells that could be drilled. However, because of the relatively shallow drilling depth, low pressure of the CO_2, and the nonflammability of the gas, control should not present any unusual problems. Well control equipment ("blowout preventors") are required on each drill site.

The surface area required for a flowing gas well is usually a 20' by 20' fenced area together with an access road and turnaround area. A "Christmas tree" to control gas flow, metering and treatment facilities, and compressor equipment would be installed on the well. In some instances water in association with the gas may enter the well and choke off the gas flow. A pump would be needed to remove the column of water. Flowlines are installed when the well is to be placed into production. The flowlines would transport the CO_2 from the wellhead to a collector pipeline system which would carry the CO_2 to the gas plant. An electrical system would be needed to supply electricity to the well sites and other facilities within the field. Flowlines, collector lines and powerline cables would be buried to the extent practicable within the roadways to minimize surface disturbance. During production little activity would occur at the well site except for periodic maintenance and daily to weekly visits to assure the well is operating properly. This would require maintaining open road conditions yearround.

Production of the CO_2 cannot begin until a pipeline to a market outlet has been constructed. CO_2 wells would be shut in until hookup to the pipeline system could be completed. "Sales" pipelines are not economical unless sufficient gas reserves are proven by drilling and a contract for sale of the CO_2 is obtained. The wells may be shut in from several months to several years until pipeline connections become available.

Wells are plugged and abandoned upon depletion of the resource. Before abandonment of a formerly producing well, the lessee must demonstrate that the well is unsuitable for further profitable production and file a Notice of Intent to Abandon (NIA) with BLM. BLM sends a copy of the NIA to the Forest Service when NFS lands are involved to obtain recommendations for final surface reclamation. Truck mounted equipment is used to plug formerly producing wells, all surface equipment is removed, and the site is

restored. The operator's bond with the Federal government covering his operations cannot be terminated until the BLM approves the surface reclamation and final abandonment of the lease area.

Major access to the CO_2 field from Escalante would be via Pine Creek road. The road is currently being utilized as a log haul road and provides access to the Forest for other users. The road has been identified in the Draft Forest Plan as a potential energy right-of-way corridor.

Based on preliminary studies, the CO_2 would be transported from the wellhead via flowlines to collector lines to a dehydration-compressor plant complex. The CO_2 would be dewatered and desulfurized, compressed, and liquified at this plant complex. Approximately 20 acres would be needed to accommodate the complex which would be constructed in or near the CO_2 field. A relatively large work force would be needed to construct the gas plant complex. During the construction there would be continuous and intensive human and construction equipment activity at the complex. After construction there would be considerably less activity but noise from the compressors and human and vehicular activity would be a continuous factor throughout the life of the field. If H_2S is found to occur in sufficient quantities, construction of a desulfurization plant may be required.

The dried and compressed CO_2 would exit the dehydration-compressor plant in liquid form and be transported in a 24-inch or larger high pressure buried pipeline to the point of utilization. A number of alternate routes would be evaluated at the time a pipeline is proposed. Pipeline construction would generate a large but very short term workforce at points along the pipeline route.

The point of utilization for the CO_2 has yet to be determined and would evolve from the establishment of a viable commercial field and the securing of a market agreement for the sale of the gas. Preliminary information indicates that a viable market exists in California for utilizing CO_2 for oil field injection to enhance oil recovery.

There is also a possibility that oil could be produced from the Escalante Anticline. The Upper Valley Oil Field, located 10 miles southwest of Escalante, has produced significant amounts of oil from the Kaibab formation. The limestones of this formation usually contain small amounts of oil but usually lack sufficient porosity within which to accumulate in commercial quantities. The Upper Valley Field implies a good potential for oil in the Escalante Anticline downdip from the CO_2 possibly in a ring (USGS Technical Report, Appendix E). Three exploratory wells did not result in discovery of producible oil and no further interest to date has been forthcoming in the possible production of oil from the Anticline. However, the possibility of the production of oil in the future cannot be entirely discounted. Further exploratory drilling and evaluation would be needed before it would be known if producible oil exists. If oil is present, it is expected to be in a relatively confined belt near the edges of the KGS with the greatest development potential near the western edge of the Anticline. It would be speculative and premature to analyze oil field development at this time since it has not been demonstrated that oil is present despite the past exploratory drilling.

TABLE 1

ALTERNATIVE LEVELS OF LEASING AND DEVELOPMENT

	Alternative I		Alternative II		Alternative III		Alternative IV		Alternative V	
	Added by Alt.	Cumulative Total	Added by Alt.	Cumulative Total	Added by Alt.	Cumulative Total	Added by Alt.	Cumulative Total	Added by Alt.	Cumulative Total
1/ Area currently leased (Acres)	23,659			1,010		8,463		15,509		16,519
2/ Proposed for lease (Acres)	0		2,151		13,423		23,921		26,072	
3/ Total KGS leased area (Acres)	23,659			25,810		37,082		47,580		49,731
4/ Areas unoccupiable (Acres)	-7,163		-184	-7,347	-1,922	-9,085	-2,271	-9,434	-2,455	-9,618
5/ Occupiable Area (Acres)	16,496		1,967	18,463	11,501	27,997	21,650	38,146	23,617	40,113
6/ CO2 Wells (Number)	(26)		(13)	(39)	(28)	(54)	(34)	(60)	(47)	(73)
(Acres)	52		26	78	56	108	68	120	94	146
Roads (Miles)	(33)		(15)	(48)	(34)	(67)	(43)	(75)	(59)	(91)
(Acres)	79		36	115	82	161	103	180	142	218
Pipelines/Powerlines (Miles)	(33)		(15)	(48)	(34)	(67)	(43)	(75)	(59)	(91)
7/ (Acres)	0		0	0	0	0	0	0	0	0
Support facilities (Acres)	2		0	2	22	24	23	25	23	25
Surface requirements 8/ (Acres)	133		62	195	160	293	194	325	259	389

1/ Total lands currently under lease within land area considered under each alternative.

2/ Includes additional land proposed to be leased under each alternative.

3/ Total lands that potentially would be under lease if alternative were adopted. Includes leased lands in Alternative I, plus lands that would be added by that alternative.

4/ Includes lands that are not occupiable. (Includes NSO Stipulation lands, 45% slopes and inaccessable lands.)

5/ Lands that can be occupied and developed for CO2.

6/ Assumes the standard 640-acre well spacing for gas fields.

7/ No additional acreage requirements are identified since pipelines are projected to be placed in roadways. However, some divergence from road locations can be expected to occur. No estimate was made of the additional acreage required.

8/ Includes total estimated acres required for well sites, roads, pipelines, and support facilities.

*( ) - not included in total.

D. Description of Alternatives

A description of the development scenarios is found on Table 1 on page 18.

Alternative I - "No Action" Alternative.

Under this alternative, it is assumed that no additional oil and gas or CO_2 (carbon dioxide) leases would be issued within the Escalante KGS, and lands presently leased would not be leased again upon expiration or termination of existing leases. However, this alternative recognizes the existing leases within the KGS which grant: "The lessee the exclusive right and privilege to drill for, mine, extract, remove and dispose of all the oil and gas deposits, except helium gas in the land leased together with the right to construct and maintain thereupon all works, buildings, plants, waterways, roads, telegraph, or telephone lines, pipelines, reservoirs, tanks, pumping stations or other structures necessary to the full enjoyment thereof, for a period of 10 years or so long thereafter as oil and gas is produced in paying quantities. . . ."

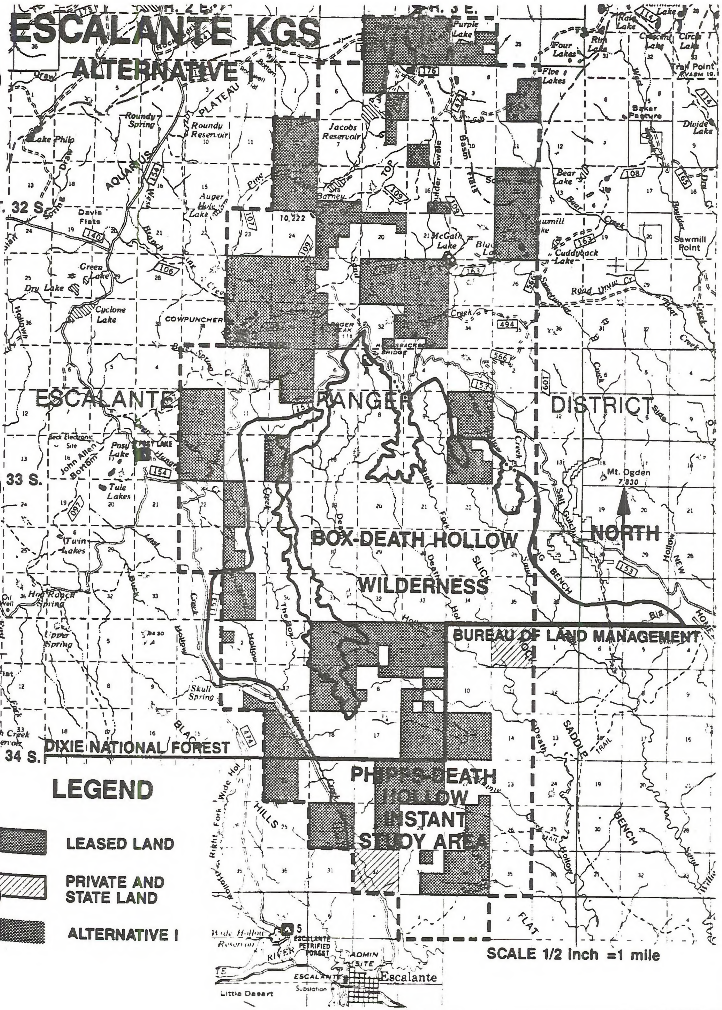
There are currently 23 leases held by eight lessees that encompass approximately 23,659 acres within the KGS. Six of these leases, encompassing 8,135 acres, are located in whole or in part within the Box-Death Hollow Wilderness and the Phipps-Death Hollow Instant Study Area. The leases within the Wilderness are recognized as valid existing rights protected under the Utah Wilderness Act of 1984. Five of the six leases located within the Wilderness and Instant Study Area were placed in suspension because approval of an exploratory drilling plan was delayed pending resolution of the Wilderness status of the areas. These leases were issued prior to the enactment of the Federal Land Policy and Management Act of 1976 (FLPMA). Any operations conducted on leases that were issued prior to FLPMA within the Instant Study Area would be subject to undue degradation standards as opposed to meeting non-impairment standards on post-FLPMA leases. The suspended leases could be reactivated by the lessees by filing and receiving approval of an application for permit to drill (APD).

Several leases were issued with the "No Surface Occupancy" stipulation that applies to 760 acres within the KGS. An additional 5,843 acres of the leased lands are either inaccessible because of extremely rugged topography or are too steep to occupy. Offsite directional drilling is not considered to be practicable. The no surface occupancy areas are discounted from the total area that would receive surface impacts.

The lands currently under lease within the KGS that can be explored and developed under this alternative are shown on the map on page 21.

Development of all the lands under lease and available for development under this alternative could result in up to an estimated 26 CO_2 wells based on the 640-acre spacing. Under this alternative, the analysis of some impacts will be based on an assumed development level of 26 CO_2 wells. Considering that there are 83 miles of existing roads within the KGS, a preliminary engineering analysis indicated that 33 miles of upgrading of existing roads or construction of new roads would be needed and 33 miles of pipelines and powerlines would be required to support the

drilling and subsequent servicing and production activities within the KGS. Existing roads would be used to the extent practicable. Roadways would also be used for the powerline and pipeline routes. Both the powerlines and pipelines would be buried in the roadways. Once the well spacing patterns were established, road locations could be planned in detail. An estimated 2 acres would be needed for service facilities and storage yards at this level of development and 20 acres would be needed for a dehydration-compressor plant complex. It is estimated that 133 acres would be needed for construction sites to accommodate this level of development.


ESCALANTE KGS
ALTERNATIVE I
R. 2 E.
R. 3 E.
T. 32 S.
33 S.
T. 34 S.
ESCALANTE RANGER DISTRICT
BOX-DEATH HOLLOW WILDERNESS
BUREAU OF LAND MANAGEMENT
DIXIE NATIONAL FOREST
PHIPPS-DEATH HOLLOW INSTANT STUDY AREA
NORTH
AQUARIUS PLATEAU
Roundy Spring
Roundy Reservoir
Jacobs Reservoir
Lake Philp
Auger Hole Lake
Barney
Davis Flats
Green Lake
Dry Lake
Cyclone Lake
COWPUNCHER
Purple Lake
Four Lakes
Five Lakes
Rim Lake
Rain Lake
Crescent Lake
Circle Lake
Trail Point
Baker Pasture
Divide Lake
Bear Lake
Sawmill Lake
McGath Lake
Blue Lake
Cuddyback Lake
Sawmill Point
Road Draw Cr.
Bear Creek
HELLS BACKBONE BRIDGE
Posy Lake
POSY LAKE
Beck Electronic Site
John Allen Bottom
Tule Lakes
Twin Lakes
Hog Ranch Spring
Upper Spring
Oil Well
Skull Spring
Mt. Ogden 7,830
Salt Gulch
BIG BENCH
NEW HOME BENCH
SADDLE TRAIL
HILLS
FLAT
10,222
Wide Hollow Reservoir
ESCALANTE PETRIFIED FOREST
ADMIN SITE
RIVER
Escalante
Little Desert
Substation
LEGEND
▩ LEASED LAND
▨ PRIVATE AND STATE LAND
▩ ALTERNATIVE I
SCALE 1/2 inch =1 mile

Alternative II - Offer New Leases for CO_2 Only Within Antone Bench and Areas 2 through 5. No oil and gas leases would be issued under this alternative.

Under Section 306 of the Utah Wilderness Act of 1984, Congress designated certain lands adjacent to the Box-Death Hollow Wilderness for special management. These were identified as Antone Bench and Areas 2, 3, 4, and 5 (Exclusion Areas). The Exclusion Areas were withdrawn from appropriation under the mining laws and from disposition under the mineral and geothermal leasing acts except that competitive leases for carbon dioxide could be issued for a period of 5 years from the date of the Act. A lease would be issued for a period of 10 years or so long, thereafter as carbon dioxide was produced annually in commercial quantities from that lease. The Exclusion Areas are withdrawn from further leasing if production in commercial quantities has not been established within the next 10 years. Any leases issued within the Exclusion Areas would be subject to the following management constraints as contained in the Utah Wilderness Act. These constraints would become stipulations to any lease that may be issued for lands within the Exclusion Areas.

Sec. 306:

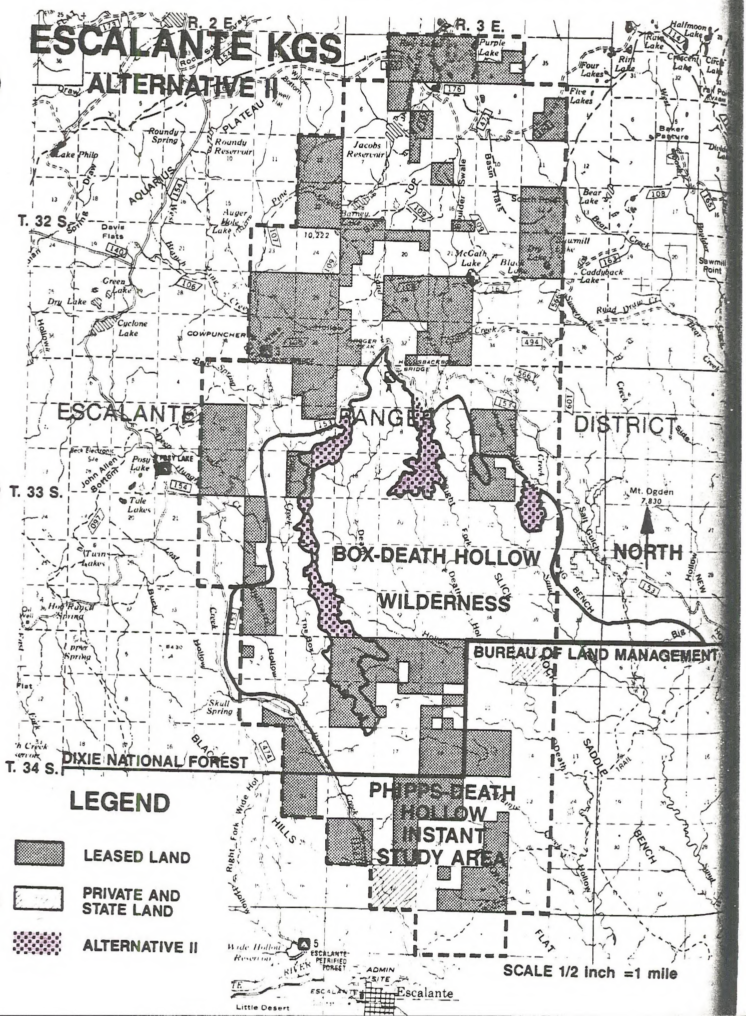
> "(3) exploration in the Antone Bench area shall be permitted only by helicopter or other methods which do not involve road construction or other significant surface disturbance.
>
> "(b) In the event development of a lease within the Antone Bench area is proposed, the following provisions shall apply:
>
>> "(1) road construction shall be limited to the minimum standards necessary for proper development of the carbon dioxide resource consistent with safety requirements;
>>
>> "(2) roads, pipelines, electric lines, buildings, compressor stations and other facilities shall, to the maximum extent practicable consistent with economic extraction of the carbon dioxide resource, be camouflaged, constructed and located in a manner that will minimize visual, noise or other intrusions in the area and in the surrounding wilderness area;
>>
>> "(3) fill material, gravel and other material used for road and facility construction shall be obtained from outside the wilderness area;
>>
>> "(4) road or facility construction shall be limited, to the maximum extent practicable, to seasons or periods where there will be minimum impacts on recreation or wildlife uses;
>>
>> "(5) roads shall be used only in conjunction with carbon dioxide development operations and shall be closed to all other vehicular use, but shall be open for foot or horse travel;

> "(6) all roads or other facilities within the area shall, when no longer needed for carbon dioxide production, be removed and reclaimed to a condition of being substantially unnoticeable;
>
> "(7) all waste, debris or other by-products associated with road construction, carbon dioxide production, or other development activities shall be disposed of outside the Antone Bench area and the Box-Death Hollow Wilderness; and
>
> "(8) consistent with State and Federal law no activities shall be allowed within the area which could significantly impair water quality or quantity in the Box-Death Hollow Wilderness and adjacent wilderness or wilderness study areas."

This Alternative considers issuing CO_2 leases only for those lands located within Antone Bench and Exclusion Areas 2, 3, 4, and 5. All of Exclusion Area 4, the southern extension of Antone Bench, and a part of Exclusion Area 2 are currently under lease for oil and gas. These leases which contain 1,010 acres are valid existing rights. The environmental effects of the development of the existing leases were analyzed under Alternative I. The lands proposed to be leased under this alternative are identified on the map on page 24, and contain approximately 2,151 acres. Approximately 184 acres of these lands were identified as topographically too steep to occupy and physically impossible to develop.

An estimated 13 additional CO_2 wells would be located within the Exclusion Areas. There are approximately 4 miles of existing roads within the Exclusion Areas, and an estimated 15 miles of road would need to be upgraded or constructed to support CO_2 production. These roads would also serve areas presently under lease. Approximately 15 miles of pipelines and powerlines would also be required for development and production. An estimated 62 acres would be needed to accommodate access roads and facilities for production of the CO_2. Because of the narrow confines of the Exclusion Areas, well sites would probably be located off the established well spacing pattern to allow for maximum drainage of the CO_2 from under the Exclusion Areas and adjoining Wilderness. Directional drilling, even if it were technically feasible, could not be approved outside of the leaseholds. Oil could be developed within the Exclusion Areas only on existing leases.

Except for those specific conditions described under this alternatve, it is assumed for analysis purposes that development of the CO_2 would take place under the same conditions and in the same manner as described under Alternative I. If this alternative (Alternative II) was selected, the assumed level of development that could result would be in addition to that identified under Alternative I. All operations proposed within Antone Bench and the Exclusion Areas would be subject to further environmental analysis and approval at the time they are proposed.


ESCALANTE KGS
ALTERNATIVE II
R. 2 E.
R. 3 E.
T. 32 S.
T. 33 S.
T. 34 S.
ESCALANTE RANGER DISTRICT
BOX-DEATH HOLLOW WILDERNESS
BUREAU OF LAND MANAGEMENT
DIXIE NATIONAL FOREST
PHIPPS-DEATH HOLLOW INSTANT STUDY AREA
NORTH
Mt. Ogden 7,830
AQUARIUS PLATEAU
Roundy Spring
Roundy Reservoir
Lake Philo
Jacobs Reservoir
Purple Lake
Four Lakes
Five Lakes
Rim Lake
Halfmoon Lake
Crescent Lake
Baker Pasture
Bear Lake
Auger Hole Lake
Barney
10,222
Davis Flats
McGath Lake
Black Lake
Dry Lake
Caddyback Lake
Sawmill Point
Green Lake
Cyclone Lake
Dry Lake
COWPUNCHER
RANGER PEAK
HORSEBACK BRIDGE
Posy Lake
POSY LAKE
John Allen Bottom
Beck Electronic Site
Tule Lakes
Twin Lakes
Hog Ranch Spring
Upper Spring
Skull Spring
Oil Well
HILLS
SADDLE
BENCH
FLAT
Wide Hollow Reservoir
ESCALANTE PETRIFIED FOREST
ADMIN SITE
RIVER
Escalante
Little Desert
LEGEND
LEASED LAND
PRIVATE AND STATE LAND
ALTERNATIVE II
SCALE 1/2 inch =1 mile

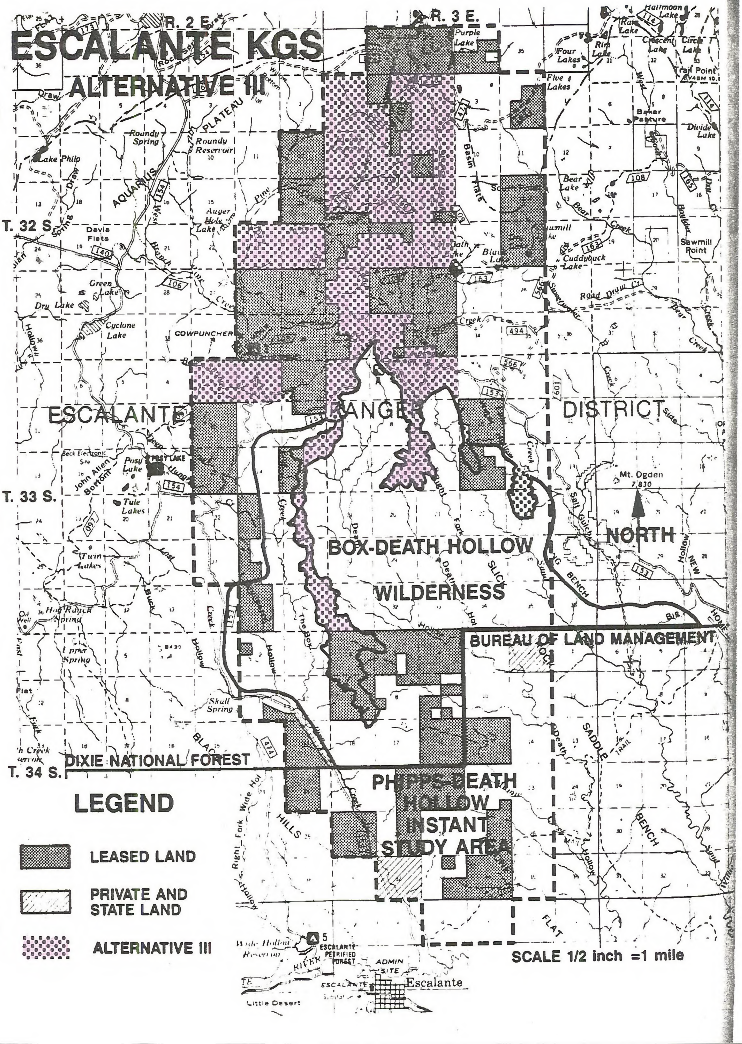
Alternative III - Offer New Leases for Oil and Gas and CO_2 Within the Area of Greatest Potential for Development.

This alternative provides for the offering of oil and gas leases on those lands within the area that had previously been proposed for unitization and within an area identified as an area with high potential for development. This alternative also includes Antone Bench and Exclusion Areas 2-5 addressed in Alternative II for CO_2 leasing. It does not propose offering the lands within the Box-Death Hollow Wilderness or Phipps-Death Hollow Instant Study Area or other BLM administered lands for lease. This alternative also provides the opportunity to address the level of field development most likely to occur within the KGS in the immediate future. A map of the lands available for leasing under Alternative III is found on page 26. This alternative includes 8,463 acres currently under oil and gas lease.

This alternative would permit orderly development of the CO_2 and provide for a sufficient level of development to permit economical recovery and marketing of the CO_2. The assumed level of development that would result from the selection of this alternative would be additive to the development level identified under Alternative I.

An additional 13,423 acres would be offered for lease under this alternative. 1,922 acres of those lands have been identified as inaccessible or unoccupiable because of topographical constraints. An additional 28 CO_2 wells could be drilled under this alternative. This level of development would require an estimated additional 34 miles of roads that would have to be upgraded or constructed and 34 miles of pipelines and powerlines to service the producing wells. An estimated additional 2 acres would be needed for storage and service facilities and 20 acres for a dehydration-compressor plant. An estimated 160 acres would be needed to accommodate construction activities if full development of the additional lands offered for lease under Alternative III were realized.

ESCALANTE KGS
ALTERNATIVE III



LEGEND

▩ LEASED LAND

▨ PRIVATE AND STATE LAND

▩ ALTERNATIVE III

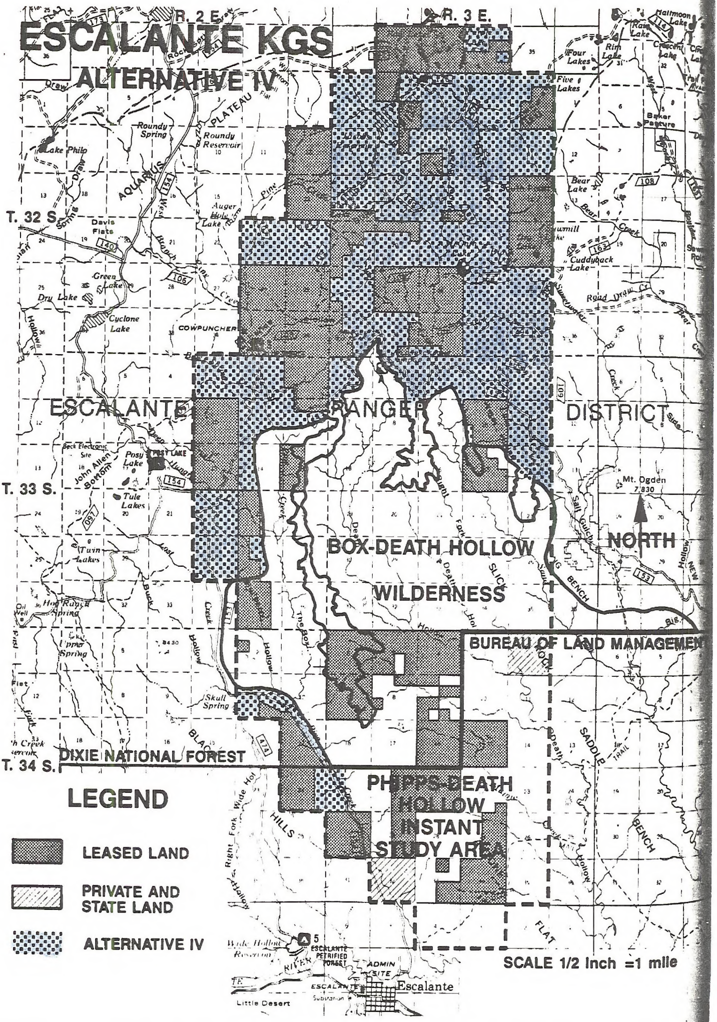
CO_2 + Hydrocarbons (not Helium).

Alternative IV - Offer New Leases Only for Oil and Gas Within Those Areas Available for Oil and Gas Leasing.

This alternative addresses the offering of oil and gas leases only on all lands within the KGS where oil and gas leasing is not constrained by law. Again, leases cannot be issued within the Box-Death Hollow Wilderness, Phipps-Death Hollow Instant Study Area, Antone Bench nor Exclusion Areas 2-5. Up to 23,921 acres are proposed to be made available for leasing under this alternative. The area included under Alternative IV contains 15,509 acres under oil and gas lease. The lands available for oil and gas leasing and considered in this alternative are identified on the map on page 28. An estimated 2,271 acres of the lands considered under this alternative are topographically too steep to occupy or are inaccessible by road and considered physically impossible to develop.

Up to an additional 34 CO_2 wells could be drilled under this alternative. It is estimated that an additional 43 miles of road would need to be upgraded or constructed under this alternative. Forty-three miles of pipelines and powerlines would be needed to service and produce the wells. An estimated additional 23 acres would be needed for storage and service facilities and compressor-dehydration plant. It is estimated that 194 acres would be required for construction to accommodate the roads and production facilities at this level of development. Leasing of all the available unleased lands for oil and gas would permit orderly development of both the CO_2 deposit and any oil that may be present. It would also provide an opportunity to explore and develop additional lands within the KGS and provide for the orderly development of existing leases. The assumed level of development that could result from the selection of this alternative would be in addition to the level of development identified under Alternative I.

ESCALANTE KGS
ALTERNATIVE IV



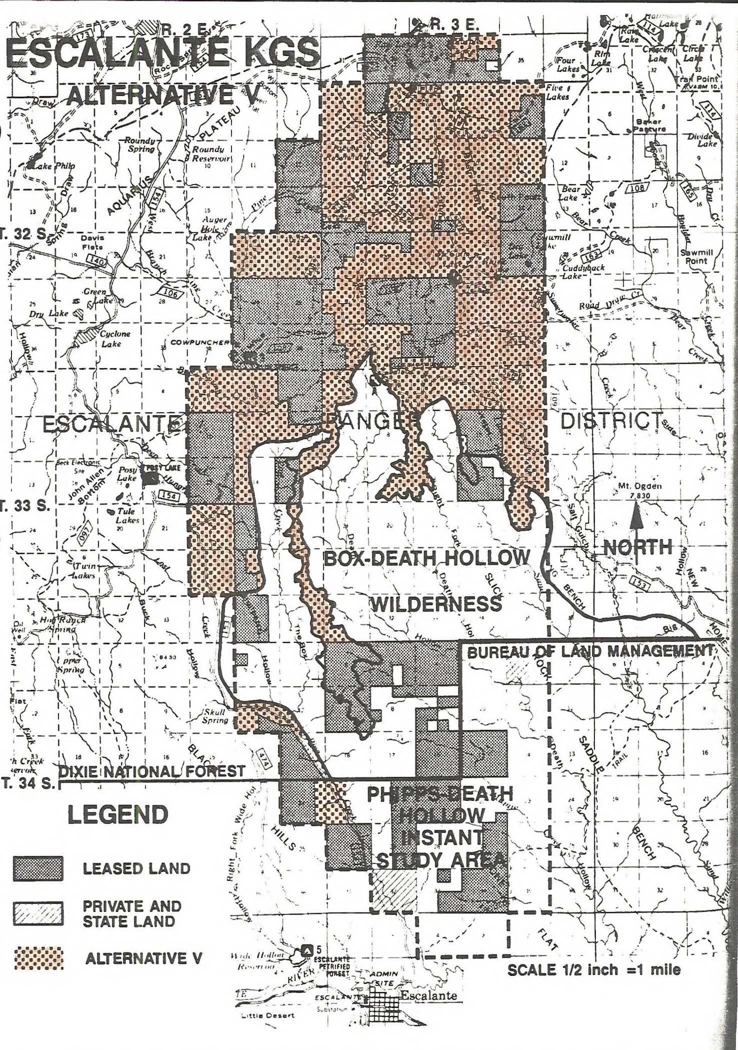
Alternative V - Offer New Leases for Oil and Gas and CO_2 for All Lands Available for Leasing Within the Escalante KGS.

Alternative V is a combination of Alternatives II and IV and represents the maximum leasing alternative. This alternative would provide the maximum opportunity for oil and CO_2 exploration, development, and production. The lands discussed in this alternative include those lands under oil and gas lease described under Alternative I and the remaining lands available for leasing within the KGS. A total of 26,072 acres would be made available for leasing, of which 2,455 acres would be either too steep or inaccessible for development. The lands available for oil and gas and CO_2 leasing in Alternative V are identified on the map on page 30.

Based on the development scenario up to an additional 47 CO_2 wells could be drilled under this alternative. This level of development could result in the need to upgrade or construct approximately 59 miles of roads in order to drill and service the wells. An estimated 59 miles of pipelines and powerlines would be needed to service producing wells if full development were realized. An additional 23 acres could be needed to accommodate service and storage facilities and a compressor-dehydration plant. Up to an additional 259 acres would be required for construction and to accommodate the roads and production facilities if full development of the KGS were realized. The assumed level of development that could result from the selection of this alternative would be in addition to that identified under Alternative I.

ESCALANTE KGS

ALTERNATIVE V



III. AFFECTED ENVIRONMENT

The KGS, as addressed in this Environmental Assessment, includes 65,000 acres of National Forest System lands within the Escalante and Teasdale Ranger Districts, Dixie National Forest; and approximately 14,000 acres administered by the Escalante Resource Area, Cedar City District, of the BLM. The KGS southern boundary is located 1 to 1 1/2 miles north of Escalante, Utah. Previous environmental and other documents have been prepared that relate to this area. They are: 1) Environmental Statements for the Land Use Plans Aquarius and Boulder Planning Units, and 2) the Draft Environmental Impact Statement and Dixie National Forest Land and Resource Management Plan. These documents are available for review at the Forest Supervisor's Office, Cedar City, Utah, or at the District Rangers' Offices at Escalante and Teasdale, Utah. Tiering may also be done using the following BLM documents. 1) Escalante Management Framework Plan, and 2) District-wide Programmatic Oil and Gas EAR. These BLM documents may be reviewed at the Escalante Resource Area or Cedar City District Offices of the BLM. Some concerns were identified by the Interdisciplinary (ID) Team which were more specific to the KGS. Therefore, a brief environmental description of these components is given in this report.

Soil Resource

The northern portion of the KGS consists of the Aquarius Plateau which is a high elevation plateau consisting of low rolling hills and swales. Geology is dominated by andesite, latite, and basalt. Soils range from moderately deep to deep and support mixed stands of spruce, fir, and aspen with large open areas of silver sage and native grasses and forbs. Stability is good and erosion rates are low.

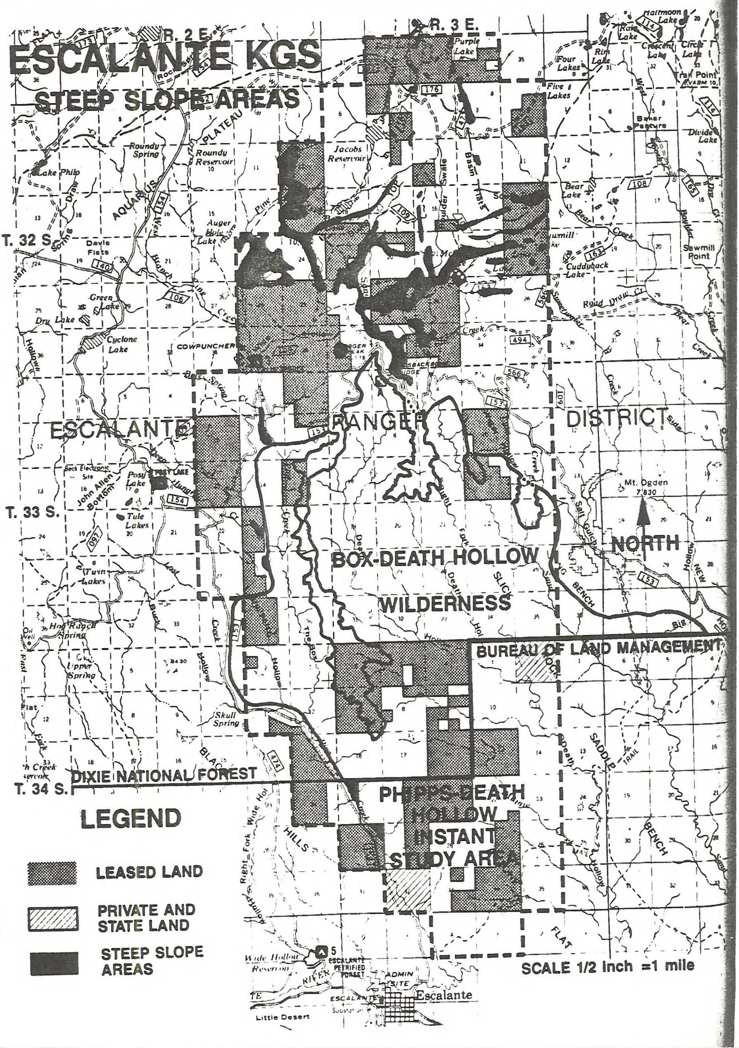
Below the plateau rim are mixed colluvial slopes associated with large slump blocks. Topography is undulating and the surface is bouldery in places. Vegetation is dominantly aspen. Soils are generally deep clay loams with some clay subsoils. High shrink-swell potentials and some mass stability problems occur in this area. Erosion rates are low.

Below the aspen belt is a thin band of ponderosa pine and Gamble oak. This area consists of deep soils formed in bouldery deposits of intermediate volcanic rocks. Slopes are gently sloping to moderately steep. Surface cobbles and stones are typical. Erosion rates are moderate. A few small areas have mass stability problems associated with old landslides and geologic formations containing gypsum.

The southern portion of the KGS consists of the Box-Death Hollow Wilderness. This area is dominated by exposures of sandstone slickrock. Vegetation is sparce. Pinyon-juniper plant communities dominate the lower elevations where soils range from shallow to deep and are typically calcarious. Erosion rates are high.

The Escalante Ranger District Land Systems Inventory describes general soil conditions for the KGS. This inventory is on file in both the Ranger District and Supervisor's Offices. Several land types have steep slopes and shallow erosive soils, occur as steep cliff escarpments, or have soils

ESCALANTE KGS
STEEP SLOPE AREAS



that either contain gypsum or show evidence of some slumping or landslides. A map showing these land types with sensitive soils is available at the Ranger District Office in Escalante. It should be noted that the entire land type may not have sensitive soils, but problem soils have been identified and care should be taken to minimize adverse impacts in these areas.

Wildlife, Fisheries, and Vegetation Resources

The KGS includes four ridges (Antone Bench and Exclusion Areas 2, 3, 4, and 5) that extend south into the Box-Death Hollow Wilderness.

All four ridges are physically similar in appearance. Vegetation is ponderosa pine, pinyon pine, Utah juniper, Indian ricegrass, bottle brush squirrel tail, blue grama, manzanita, yucca, and numerous forbs and other grasses.

Common wildlife species in the area are: mule deer, coyotes, badger, wood rats, least chipmunks, red squirrels, common flickers, mountain chickadees, nuthatches, yellow-rumped warblers, mountain bluebirds, western bluebirds, red-tailed hawks, and Swainson's hawks. Some less common species are: cougar, black bear, elk, wild turkey, goshawk, and the Mexican Spotted Owl.

Also discussed in this Assessment is the area north of the Hells Backbone Loop Forest Development Road (FDR No. 30153), north to Purple Lake, and the Row Lakes. North of the Hells Backbone Loop Road as the elevation increases, aspen and Douglas-fir become more prominent in the overstory. Farther northward in the Jacob's Valley/Boulder Swale/Purple Lake area, overstory vegetation becomes primarily spruce and subalpine fir mixed with some aspen. Dry sagebrush meadows are interspersed with the timber stands. Most of the timber stands have a relatively closed canopy and a correspondingly sparse understory. Wildlife species at these higher elevations are similar to those at lower elevations; elk, bear, and deer would be more numerous, wild turkey would be less numerous. The Spotted Owl would not occur.

A number of wet meadows and small lakes are scattered throughout the area. Some of them, such as McGath Lake and Purple Lake are good fisheries. The Row Lakes have good fisheries potential. Others; i.e., Barney Lake provide some good waterfowl habitat. In addition to these lake fisheries, Pine Creek, Sand Creek, Lake Creek, and Deep Creek support sport fisheries. All of these fisheries are accessed only by primitive roads.

A listing of threatened, endangered, and sensitive plant and animal species in and near the Escalante KGS is presented on the following page.

THREATENED, ENDANGERED, AND SENSITIVE
PLANT AND ANIMAL SPECIES
in and near the
ESCALANTE KGS

Species	Status
Peregrine Falcon	E 1/
Mexican Spotted Owl	S 2/
Western Bluebird	S
Bald Eagle	E
Sandhill Crane	S
Golden Eagle	S
Prairie Falcon	S
Cooper's Hawk	S
Ferruginous Hawk	S
Great Blue Heron	S
Merlin	S
Flammulated Owl	S
Ban-tailed Pigeon	S
Williamson's Sapsucker	S
Black Swift	S
Grace's Warbler	S
Lewis Woodpecker	S
Jones Golden Aster (*Heterotheca jonesii*)	S
Neese's Peppergrass (*Lepidium montanum*)	S
Aquarius Indian Paint Brush (*Castilleja aquariensis*)	S
Least Townsendia (*Townsendia minima*)	S

1/ E=Endangered species
2/ S=Sensitive species

Visual and Recreational Resources

The KGS is characterized by three separate visual landscapes. The southern end contains many outstanding rock formations. The Box-Death Hollow Wilderness contains landscapes that are unique in the State.

The central area above the Hells Backbone Loop Road contains country that is steep to rolling. The slopes are heavily vegetated with ponderosa pine, spruce and aspen. The aspen attracts many people to the area during the fall when the colors of the leaves are changing. Much of this area has been logged to remove trees that were infested with Mountain Pine Beetle or Spruce Bark Beetle.

The northern area is flat to rolling and heavily vegetated with spruce, fir and aspen. There are also many large openings with small lakes and reservoirs. Most of the spruce stands have been logged in the past and

many remnants of the old road system remain. The area is covered with large rocks and the old roads are rough and difficult to drive.

The Aquarius-Teasdale Road (FDR No. 30154) and the Hells Backbone Loop Road are the major through roads in the area. The Pine Creek road, one of two through roads over Boulder Mountain to Teasdale, is used quite heavily during the summer as a major travel route in and out of Escalante. Posy Lake is a major attraction for fishermen and campers during the summer. The Hells Backbone Loop Road is used regularly by tourists and recreationists visiting the area. The road provides major access to the top of the Box-Death Hollow Wilderness. These roads are classified as Sensitivity Level 1 in the landcape management system due to the type of use they receive. Management activities along these roads, within one quarter mile, should not be evident if they are to meet the criteria for landscape management. All activities located within the Wilderness must meet the criteria for retention and should not be evident from the major travel routes.

The Spectacle Lake Road (FDR No. 30162) is a major collector route used by fishermen and hunters. However, less than seventy-five percent of the use on this road is recreation oriented. Therefore, the classification for this road is partial retention, management activities in the foreground can be evident but should not dominate the natural landscape.

Recreation opportunites vary from developed sites at Blue Spruce to the primitive recreation opportunities in the Wilderness. The area adjacent to Hells Backbone Loop and Posy Lake Roads provide a roaded natural recreation opportunity. It is characterized by modification for conventional motorized recreational opportunities with facilities to accommodate this type of use. The environment has been modified, however, the modifications often are in harmony with the natural environment.

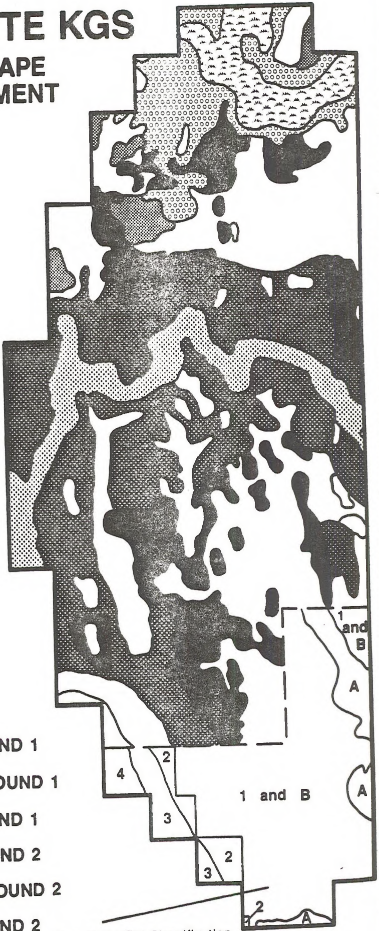
The area north of Hells Backbone Loop Road is characterized by a natural appearing environment. Recreational use in this area is low except during the fall hunting season. Past timber sale activity is evident. Motorized recreation opportunities exist; however, some of the roads are in poor condition and can only be used during good weather conditions. The demand for semi-primitive motorized recreation opportunities is increasing as motorcycles and all terrain vehicles become more popular. Much of this area is capable of handling this type use with little resource damage.

There are some areas north of Hells Backbone Loop Road, under the rock rim, that are wet slump lands. These areas are characterized by very unstable slopes and are undesirable for road location and construction. The small lakes in this area, like McGath, contain a fishery that will not support heavy fishing pressure. This area provides an excellent opportunity for backpacking and horseback use. This area is proposed to be managed for semi-primitive recreation opportunities. Motorized access may be permitted, if it becomes necessary, for the management of the area but, the major use should revert to non-motorized.

The KGS was inventoried for recreation potential using the guidelines developed for the Recreation Opportunity Spectrum (ROS). This inventory

ESCALANTE KGS

LANDSCAPE MANAGEMENT



LEGEND

░ FOREGROUND 1

▓ MIDDLEGROUND 1

█ BACKGROUND 1

▨ FOREGROUND 2

▒ MIDDLEGROUND 2

▓ BACKGROUND 2

□ UNSEEN

See BLM VRM Classification
Located at
Escalante Resource Area Office

classified the area into three separate opportunity classes (Primitive, Semi-Primitive Motorized, and Roaded Natural).

The primitive area is characterized by an unmodified natural environment. Interaction between users is low and evidence of other users is minimal. There is an extremely high probability that the Forest visitor can experience an isolation from the sights and sounds of others. The user experiences a high degree of challenge and risk while visiting the area.

The semi-primitive motorized area is characterized by a predominately natural or natural appearing environment. Concentration of users is low, but evidence of other users is present. The opportunity exists within this area to experience a feeling of isolation from the sights and sounds of other humans. Users of this area have the opportunity to develop self reliance through the application of woodsman and outdoor skills in an area that offers challenge and risk. Motorized equipment can be used in the area if the need arises for management purposes, but after the need has been met motorized vehicle use is discontinued. Roads for non-recreation purposes should be constructed to a minimal standard compatible with the semi-primitive environment and located so they would not detract from the management objective. Once the activity is completed, the traffic would be controlled to whatever degree necessary to maintain the desired Forest setting.

The roaded natural area is within one-half mile of the Hells Backbone Loop Road, the Spectacle Lake Road, and the road to Row Lakes. The area is characterized by a predominately natural appearing environment with moderate evidence of the sights and sounds of man. Interaction between users is low to moderate, but evidence of other users is prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment.

Opportunities for both motorized and non-motorized forms of recreation are possible. Activities such as driving for pleasure, viewing scenery, picnicking, fishing, snowmobiling, and cross-country skiing are possible. Conventional use of highway-type vehicles is provided for in design and construction of roads. Motorized travel may be restricted to designated routes, to protect physical and biological resources.

Water Resources

The KGS is located on portions of the top and southern sideslopes of the Aquarius Plateau within the Escalante River watershed. The elevation of the area ranges from around 6,000 to over 10,000 feet above mean sea level. Average annual precipitation levels range from 25 inches on the plateau top to 11 inches in the areas adjacent to Escalante. Snowfall is the dominant form of precipitation in the winter and comprises up to 65 percent of total precipitation in the higher elevations. Snow depths in excess of 4 feet are not uncommon. The area is subject to intense short duration thunderstorms in late summer which account for most of the peak flows in local streams. These summer storms also commonly produce flash flooding in numerous dry washes and intermittent streams, particularly in the canyon region below the Hells Backbone-Pine Creek road. This region

has very high surface runoff rates due to extensive areas of exposed bedrock and very shallow soils.

Three major tributary streams of the Escalante River cross the KGS. Pine Creek to the west, Death-Hollow to the south, and Sand Creek to the east and north. Pine Creek is a perennial stream rising from springs and lakes on the top of the Aquarius Plateau. Below the Hells Backbone Loop Road, it runs in a steepsided sandstone canyon (the Box) where it commonly diminishes in flow. This section of the stream is particularly subject to flash flooding. The average flow of Pine Creek is 4.8 cfs (cubic feet per second) as measured at the USGS gaging station at the mouth of the Box. The estimated 100-year flood at this point is 1,727 cfs. Pine Creek is diverted for irrigation purposes below the mouth of the Box. The water quality in Pine Creek as sampled at the Hells Backbone Loop Road above the Wilderness is generally very good. The stream does, however, carry heavy sediment loads in its lower reaches during storm runoff events. Pine Creek is a Class IV fishery stream and is stocked with rainbow trout by the Utah Division of Wildlife Resources. Brown trout have also been found in the stream. Three of the four principal perennial tributaries of Pine Creek, Hungry Creek, Deep Creek and Blue Spring Creek, also flow across the KGS. These streams flow through the timbered plateau sideslopes above the canyon region and generally have very good water quality.

Death Hollow arises within another steepsided sandstone canyon below the Hells Backbone Loop Road. Because of its remote location, little flow or water quality data is available for this stream. It is, however, subject to frequent flash flooding and pulses of high sediment concentration. Its major perennial tributary, Mamie Creek, also flows within the KGS. Mamie Creek supports populations of non-sport fish species and some rainbow trout.

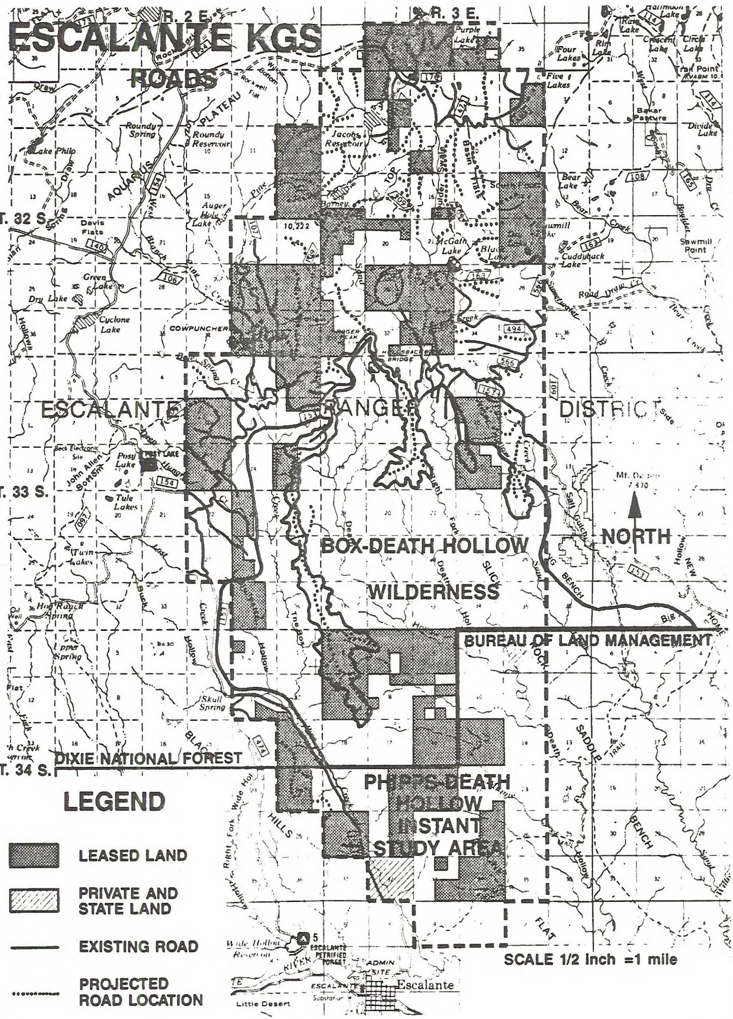
Sand Creek has similar watershed characteristics and streamflow regimen to Pine Creek, although it is smaller in size. Water quality as measured at the Hells Backbone Loop Road is very good. Lake Creek and Boulder Swale, perennial tributaries of Sand Creek, also flow through the KGS. They are both dewatered by private irrigation diversions in the Salt Gulch area.

Several small lakes are located within the KGS. They are found primarily on the plateau top and in the slumplands immediately below the plateau rim. Many are quite shallow and subject to considerable seasonal fluctuation in surface area.

In addition to the riparian areas associated with perennial streams and lakes, there are also several small, isolated patches of riparian vegetation in the upper portions of the KGS. They are generally associated with small springs. These springs are important for wildlife and stockwatering purpose.

Transportation System

Portions of the Escalante KGS have a transportation system. Many of these roads have been constructed within the last five years to provide access to timber sales in the area.


ESCALANTE KGS
ROADS
R. 2 E.
R. 3 E.
T. 32 S.
T. 33 S.
T. 34 S.
ESCALANTE RANGER DISTRICT
BOX-DEATH HOLLOW WILDERNESS
BUREAU OF LAND MANAGEMENT
DIXIE NATIONAL FOREST
PHIPPS-DEATH HOLLOW INSTANT STUDY AREA
NORTH
Mt. Dutton 7,330
AQUARIUS PLATEAU
Roundy Spring
Roundy Reservoir
Lake Philo
Jacobs Reservoir
Purple Lake
Four Lakes
Rim Lake
Five Lakes
Crescent Lake
Circle Lake
Trail Point
Baker Pasture
Divide Lake
Bear Lake
Sawmill Lake
Sawmill Point
Cuddyback Lake
McGath Lake
Black Lake
Auger Hole Lake
Davis Flats
Green Lake
Dry Lake
Cyclone Lake
COWPUNCHER
HORSEBACK BOX BRIDGE
Posy Lake
John Allen Bottom
Beck Electronic Site
Tule Lakes
Twin Lakes
Hog Ranch Spring
Upper Spring
Skull Spring
BIG BENCH
SADDLE TRAIL
FLAT
Wide Hollow Reservoir
ESCALANTE PETRIFIED FOREST
ADMIN SITE
ESCALANTE
Escalante
Little Desert
RIVER
10,222
LEGEND
LEASED LAND
PRIVATE AND STATE LAND
EXISTING ROAD
PROJECTED ROAD LOCATION
SCALE 1/2 inch =1 mile

The Hells Backbone Loop Road is an arterial road, providing access to Escalante on the south and to Boulder on the north. This road runs through the center of the KGS and is the major access to the area. The first 10-mile section of this road (from Escalante to the Aquarius-Teasdale Junction) is a double lane road with crushed aggregate surface. The rest of Hells Backbone Loop Road is a single lane road. All but 2 miles of the road on each side of the Hells Backbone Bridge has a crushed aggregate surface.

The Spectacle Lake Road is currently planned for reconstruction during the summer of 1987 and for surfacing during the summer of 1988. This road is considered a major collector road and provides access to areas above the Rim.

All other roads within the KGS are considered to be either minor collector or local roads and are single lane roads. Most of the roads have a native surface.

The area between the Rim and Spectacle Lake Road is currently planned for the Jacob's Valley Timber Sale and the Boulder Swale Timber Sale. The proposed roads for this area could also be used for oil and gas exploration.

Socio-Economic

Nearest communities, their proximity to the Escalante KGS, and their estimated population are shown in the following table:

POPULATION AND DISTANCE TO KGS

COMMUNITY	POPULATION	MILES TO BOUNDARY
GARFIELD COUNTY, UTAH		
Escalante	675	1
Tropic, Henrieville, Cannonville, Bryce Valley area	670	45
Boulder	130	10
Antimony	110	48
WAYNE COUNTY, UTAH		
Bicknell	329	35
Loa	404	40
Torry	146	43
Teasdale	97	45

The economic situation of these communities has not been very optimistic during the past few years. Development of new industry and new job opportunties for local residents have been minimal.

The economic base for this area is directly attributed to agriculture, a sawmill in Escalante, a few other small ventures, and tourism. Tourism has become of particular importance for the whole Southern Utah area, since several National Parks are located in this part of the State.

Most of the small towns around Escalante have very deep traditional lifestyle values. These values can be traced back to early pioneer settling periods of Utah. These values dictate much of present local activities and view points.

Communities in the area are relatively small with limited resources available for large development or industries. For example, housing and water are critical in many Southern Utah commmunities.

IV. ENVIRONMENTAL CONSEQUENCES

Because this Assessment addresses lease recommendations and not site-specific development plans, it is necessary to evaluate the alternatives with the assumption that some exploration and/or development would occur as described in Section II of this Assessment. A level of development beyond this predicted scenario is not expected since the assumed development should be capable of extracting the mineral resource. However, in the absence of site-specific plans for exploration and/or development at this time, it is necessary to base this Assessment on an assumption of what can be expected to occur as a result of leasing. Complete development of the entire KGS is very unlikely; however, partial development of certain areas within the KGS is very likely. This is particularly true of CO_2 field development in the southern half of the KGS since recent drilling information confirms the presence of commercial quantities of CO_2. Oil field development may occur as a result of leasing of some areas within the KGS, but is less probable than CO_2 development.

An acceptable plan of operation must be submitted by the lessee or unit operator prior to approval by the BLM. Both the BLM and the Forest Service monitor mineral operations on National Forest System lands. The Forest Service responsibility as surface management agency is for protection of the surface resources and reclamation of disturbed areas. Site-specific mitigation is developed as a result of the environmental analysis for the proposed operations. Many of the issues and concerns identified during scoping for this document would be addressed when a site-specific proposal is presented for review.

Once a lease has been issued, the right to utilize and occupy the surface to extract the mineral has been granted. During the operating plan environmental analysis, the option of denying all exploration or development on the lease is not an administrative alternative as long as the operating plan complies with applicable laws, regulations, terms of the lease, and lease stipulations. However, the rate of development may be controlled and certain operations denied or not approved as proposed.

Some additional assumptions on which environmental consequences were based are:

A. Due to past drilling information, CO_2 field development would likely occur.

B. Development would not require an abnormal number of well sites, but would be consistent with past field development.

C. All drill sites, pump stations, etc., would be reclaimed during and/or following drilling or production operations.

D. The following jobs would be created from the development and production of a CO_2 field. These figures are estimates only, obtained from "Natural Carbon Dioxide Resource of Colorado: An Overview" and local contractor information. Although the figures are estimates, they present a sample of the effects of field development.

Employment

	Direct	Indirect	Population Increase (2.33 to 1)
Production Phase	15	3	42
Development Phase	200 1/	40	466

1/ Half of this number is expected to be local employment opportunites. Annual salary \$20,000/year. The development phase is expected to take 1 1/2 years.

Dollars generated by salaries only.

Development Phase: \$4.8 Million Annually
Production Phase: \$360 Thousand annually

E. Unitization of leases is probable, involving existing leases and any new leases that may be issued.

F. Exploration work would increase throughout the KGS.

G. CO_2 field having a 20 year life would be developed.

H. Returns to the government would occur from royalties, rentals, and taxes.

A narrative of probable environmental consequence for each alternative was developed based on the expected scenario and assumptions presented in Section II, Alternatives.

Alternative I

Soil Resource

If development and production occur on existing leases, significant soil disturbance would occur in association with road construction, drill pad construction, and other related development activities. For the most part, only standard stipulations apply to the existing leases; however, several leases contain no surface occupancy stipulations which would protect sensitive areas.

Many of the existing leases occur on either very steep slopes, slickrock, and shallow erosive soils, or on soils that either contain gypsum or show evidence of slumping or landslides.

Road access and drill pad location would logically occur on the more gentle slopes, however, to access some of the leased areas, soil disturbing activities would have to take place on steep erosive soils. In these areas, accelerated onsite soil erosion may exceed acceptable limits. Site soil productivity is low on most of the leased areas south of the Hells Backbone Loop Road. The loss of site productivity due to erosion in this area would be insignificant. However, offsite impacts of the additional sedimentation could be significant in Pine Creek, Sand Creek and other streams that drain the area, and to other downstream values.

The areas that show evidence of slumping or contain gypsum typically occur in the central portion of the KGS and along the west boundary. Many of the leases also occur on these soils. Road construction and drill pad location on these soils could initiate slumping, particularly if gypsum and subsurface water were intercepted on the cut slope.

In summary, development of oil and gas over the entire KGS would have an impact from the standpoint of soil disturbing activities. Approximately 133 acres would be taken out of production due to roads and drill pads, however, much of the area has very low productivity. Onsite soil erosion would increase; however, the impact on reduced site productivity should be minimal. No surface occupancy stipulations in the existing leases would protect the most sensitive areas, thereby minimizing most of the potential adverse impacts to the soil resource.

Wildlife and Fisheries Resources

Approximately 23,659 acres in the KGS are under lease. If the lessees exercise their rights to develop these leases, approximately 33 miles of road would be constructed or upgraded to access the leases. An estimated 26 wells would be drilled. The effects of implementation on wildlife and fish would be directly related to the number of wells drilled and the number of miles of road per square mile of habitat. Any additions to the existing road density would be detrimental to most species of terrestrial wildlife. Antone Bench and the other Exclusion Areas are essentially "peninsular" in nature; bounded on three sides by steep cliffs. Any roads in those peninsulas would be especially detrimental since wildlife would have no escape routes. Drilling or road activity near the cliffs would be

disturbing to nesting bird species such as the sensitive Mexican Spotted Owl or the endangered peregrine falcon that could potentially be using the cliffs. In addition to the roads, facilities such as drill pads, pipelines, powerlines, a compressor station, etc., would compound the disturbance and habitat loss problems.

There are approximately 4,000 acres of land under lease in the Box-Death Hollow Wilderness. It is assumed that no development would occur on several of these leases because it is not feasible to get roads into them. Perhaps half of the leased area within the Phipps-Death Hollow Instant Study Area can be reached by road. Because of these access limitations, there would be a corresponding decrease in the amount of wildlife habitat disturbance in the southeastern portion of the KGS. The most probable disturbances in this area would be to cliff nesting birds or small mammals or to threatened, endangered, or sensitive plant species.

North and west of the Wilderness (north of the Hells Backbone Loop Road) approximately 75% of the KGS is leased. Most of this area, with the exception of the plateau rim would be roaded. Road densities would probably be between 2 and 3 miles of road per square mile of habitat. These road densities are very disturbing to most wildlife species, but because this area is not as confining to work in as Antone Bench and the Exclusion Areas, there would be more opportunity to avoid important areas of fish and wildlife habitat. Habitat would still be disrupted with roads, drill pads, powerlines, pipelines, and other activities associated with exploration and development. Research has shown that road densities in excess of 2 miles per square mile of habitat reduce habitat effectiveness for deer below 85% and for elk below 50%. Road densities of 3 miles per square mile reduce habitat effectiveness to 69% for deer and to 35% for elk. Habitat effectiveness can be expected to be somewhat lower than this during exploration and development phases because of the amount of human activity during these periods. Exploration and development within or near the riparian zones associated with lakes, streams, and wet meadows would be disturbing to terrestrial and avian species frequenting these areas. The existing roads to McGath, Purple, and the Row Lakes are primitive "jeep" trails. Improved access to these areas would put additional fishing pressure on these lakes that they could not support and would diminish the backcountry fishing experience now available. Sediment introduced to streams from road and drill pad construction and use could impair or temporarily destroy trout spawning habitat. Chemical spills could kill fish and macroinvertebrates. Increased activity through out the KGS would increase the likelihood of wildlife-vehicle collisions, of illegal shooting, and other harrassment of fish and wildlife.

Visual and Recreational Resources

Alternative I allows the development of existing leases. Development of the leases would cause changes in the visual landscape and the recreation experience available in the KGS.

The potential for impact to the visual landscape may be assessed by viewing the landscape management map on page 46. The map is correct only to plus or minus 200 feet vertically so that the high areas are rounded down to the

nearest 200 feet as are the low areas. No consideration was given to vegetative screening. Therefore, areas indicated as visible reflect the maximum potential of an area to be seen when, in fact, vegetation may screen it from travelers on the major raods. When individual projects are proposed more detailed surveys would need to be completed to evaluate the actual consequence of the proposed activities.

The map shows Antone Bench as being in the middle ground of a level one road. The unique landscape character and visibility of the Bench indicates that the visual objective would be to retain the natural conditions.

Antone Bench offers the only surface access to leases in the south end of the KGS. Roads, pipelines, and powerlines would all need to be located on the Bench to get men and equipment to the southern leases and get oil and gas out. The indication is that many of the physical changes in Antone Bench could be visible from major access routes. If so, they would not meet the visual objective. The commotion of people and machinery using Antone Bench for access to the southern leases would change the recreation experience from semi-primitive or primitive to roaded natural. Most of this impact would be during the construction phase when the heavy drilling equipment is on the road. Pumps would continue to add to the noise after the construction phase had been completed. Once the construction and production phases of the field and the reclamation had been completed the area would be permitted to return to a semi-primitive recreation experience level. The evidence of man and his activities would likely always be present on the Bench and on many of the barren rocky hillsides. The pristine recreation experience of being in an area that has been untouched by man would likely not be possible again.

The leased lands located in the center of the KGS are wholly or partially within the foreground and middle ground of the Hells Backbone Loop Road. The management objective for areas in the foreground is that activities should meet retention of the visual qualities. Activities in these areas should not be evident to the Forest visitor.

The Hells Backbone Loop Road is the most logical location for a connecting pipeline that would carry gas from the east side of the KGS to the west. Lines from the north and south would likely flow to this central road and then to the compressor station. The existence of the pipeline along the road has the potential to disrupt the landscape in a manner that would be visible for years if not indefinitely. Trenches dug in the areas where there is little or no soil would have to be blasted out of solid rock. Where this happens it would be difficult to reclaim the area to a natural appearing landscape.

A structure that houses the compression equipment would be large and prominent. The complex is estimated to cover 20 acres. Normally the size of compressor stations and associated equipment makes it difficult to fit into the natural environment. Such a complex has potential to dominate the landscape if it is located in an area that can be seen from the Hells Backbone Loop Road.

All gas pipelines would be routed into the central compressor station. The gas would then be compressed and put in a 24" or larger pipe to transport

the gas from the area. The larger line would have to be buried to a depth of 7 or 8 feet to maintain a constant temperature. Burying the pipelines would result in significant disturbance to the road. Large rocks brought up during the excavation would have significant impact on the visual quality of the landscape along the road. Corridors through the vegetation where the line leaves the road would be visible for some time after the excavation had been completed.

The corridor along the Hells Backbone Loop Road is presently being managed for roaded natural recreation. People who are visiting the area for the scenic quality are usually traveling at a slow rate of speed. This type of traffic would have problems with trucks transporting heavy drilling equipment and water trucks traveling the road. Recreation use of areas that now receive little use would increase as access becomes easier. Additional side roads would tend to confuse visitors unfamiliar with the area without proper directional signs.

Leases at the northern end of the KGS would be accessed by the Spectacle Lake Road. The majority of the leases in this area are in the foreground and middle ground distance zone from this road. The visual management objective for the foreground areas is partial retention of visual quality with modification of the middle ground areas permitted. Activities on the leases in the northern end would likely meet the objective for visual management because the topography and vegetation can accommodate activities without their dominating the natural landscape. The powerline supplying power to the area would likely cross this northern end. This line would require a cleared right-of-way which would dominate the foreground if it crossed the Spectacle Lake Road. The large open meadows and rocky soil make it difficult to trench in the northern portion of the KGS without high visual impacts.

The northern portion of the KGS, being flat and primarily an aspen vegetative type, is easily accessible by vehicles. Many of the travel routes in this area were created by one vehicle cutting across meadows or flats to reach a desired point. Others then followed and the tracks became a road. With development of the existing leases, more areas would become susceptible to this type of roading and the existing problem would be expanded. The addition of vehicles into the area would change the recreation experience from a primitive or semi-primitive to a roaded natural classification.

Water Resources

This alternative would result in a somewhat lower level of impact on the quality and quantity of surface water resources than the other alternatives primarily due to its smaller scale of operations.

During the exploration phase there would be only a minor consumption of water in the drilling operations. This water would probably involve small scale withdrawals from streams, lakes, or reservoirs in the KGS.

Considerably larger quantities of water would be required during the early development stages of the CO_2 field. An estimated 33 miles of new roads could be constructed or upgraded during this phase. This level of

construction could result in up to 10-acre feet of withdrawal from surface waters for compaction and dust control purposes. Up to an additional 26 acre-feet of water would be required at the drill sites. This consumption would occur over a relatively short period of time. However, withdrawals from surface waters could be carefully supervised so as not to impact National Forest water rights and uses. The development firms will need to purchase their needed water from private users off the Forest. Culinary water would probably be trucked in from Escalante. During the production phase, levels of water consumption should decline. If a gas field is fully developed, it is likely that there would be an increased requirement for municipal culinary water in Escalante. This would probably mean increased utilization of springs and surface waters in the Escalante municipal supply watershed in the vicinity of Posy Lake. Significant expansion of the municipal withdrawals in this drainage could lead to conflicts with existing National Forest water uses in the area.

Stipulations attached to existing leases generally provide for protection of riparian areas in the KGS. However, there would be some loss of riparian ecosystem where new roads, and pipelines cross streams. Approximately seven new stream crossings could be required by the additional roads necessary to access existing leases.

It is assumed that pipelines would cross streams along road alignments. These activities would not result in an unacceptable reduction in riparian habitat. One exception may occur in the Sand Creek drainage bottom. A high concentration of development facilities in the narrow bottom in this drainage could result in a significant impact to its riparian habitat. There would be no impact to riparian ecosystems within the Wilderness or ISA.

Increase in stream sedimentation would be the primary impact on water quality in streams and other surface waters in the KGS. Erosion rates would increase in the KGS during the development phase of the CO_2 field due to the considerable amount of soil disturbing activity such as the construction of new roads, pipelines, powerlines, drill pads and processing facilities. Although the initial increase in erosion could be quite high locally, the effect on stream sedimentation would be moderated. Most of the new roads and facilities would be located at a considerable distance from surface waters. Where roads and facilities were near streams, mitigating measures could be employed to limit the amount of sediment reaching the channels. Although the sedimentation rate associated with construction activities could deleteriously impact some local stream reaches in the upper portion of the KGS (in Sand Creek, for example), the cumulative impact of sedimentation on stream channels in the Wilderness and Instant Study Area would be insignificant. Any induced sedimentation would be masked by the already high natural sedimentation rates in this canyon country. The effects described above would be short term. Within 2 or 3 years after construction activities are completed, induced erosion and sedimentation should decline to a small fraction of the initial increase.

Development of CO_2 could also pose another problem for surface water quality. As the gas field is developed, there would be a potential for accidental spillage or seepage of drilling compounds, produced water, or

hydrocarbon compounds to surface waters. Impermeable reserve pit linings and diking of drill pads to control surface runoff could be utilized where surface or groundwater contamination is a concern. Other wastewaters generated would either be trucked off the mountain, evaporated in pits, reinjected in deep wells, etc. In general, there is little likelihood of contamination from these sources when mitigating measures are enforced. A larger project, however, could make it difficult to monitor and enforce water quality protection measures under current manpower constraints. The impacts of accidental spillage or leakage of pollutants, although serious, would most likely be localized in extent and short term in duration. There is insufficient information available at this time to determine if a corresponding increase in emitted H_2S would result in any significant effects on water quality. Significant pollution of waters within the Wilderness and Instant Study Area from these sources would be unlikely.

Very little data is available on the ground water resources of this area. It is difficult to accurately assess what impacts any future drilling project would have on ground water resources such as the springs in the canyon bottoms of the Box-Death Hollow Wilderness. These canyons are developed in the Navajo Sandstone Formation. Wells drilled in the surrounding upland areas may perforate water-bearing strata or fracture zones in this formation enroute to deeper strata containing CO_2. Localized contamination or flow disruption in the aquifer could possibly occur under these circumstances. It could be possible to effectively mitigate any such impact by using mudding techniques to isolate the water-bearing strata or zones.

Existing leases include provisons for adequate protection of springs and public drinking water supplies. No significant impact would be expected to occur from oil or CO_2 development.

Socio-Economic

Considering the expected development of existing leases, differences between alternatives for socio-economic impacts would be relatively insignificant. Only minor differences are expected between Alternatives I, II, and III. Impacts to the socio-economic situation at the leasing stage of mineral development can only be speculative in nature. Increased oil and gas leasing in the KGS alone would not affect nearby communities. Development on existing leases would probably create socio-economic change in the local communities.

Although no formal proposals exist upon which actual employment and population increases could be based, development of existing leases would change the socio-economic structures of local communities. In fact, the changes could be very dramatic depending on the scale of development. Where other development or a sound economic base and facilities are not in place such as in the small communities in the geographic vicinity of the KGS, CO_2 development could disrupt existing lifestyles and local economies. Full scale development of the CO_2 including the drilling of additional wells and construction of the pipelines and dehydration-compressor plant would result in a rapid population influx and the economic growth. This would benefit the sales and service sector of the economy but would also place a great demand on community services and

facilities. Tax revenues from CO_2 development would be a significant benefit to local governments. However, most major adverse impacts occur during the development of a field before a significant tax base upon which to mitigate impacts from rapid population growth could be established.

Economic benefits to the communities would be very welcome by local residents. This economic benefit would come in several forms. First, services which local contractors or individuals can perform would increase dramatically especially during the development phase. Second, salaries would be spent in local business increasing the need for more local business. Third, tax collections would be made in the state and county where the workers are located. Fourth, monies for rents and royalties collected from oil and gas leasing and production on Federal lands are shared by state and local governments. Fifth, goods needed for mineral development could be purchased locally.

A large additional workload would be placed on schools, medical facilities, transportation systems, police and fire protection and municipal sewer and water systems. Housing and community services would be over extended which would create a need for temporary housing facilities. Typically sufficient services lag behind the influx of new workers and the quality of service for all may suffer. As the development stage progresses to production, the demand for services would decrease. The short term may be viewed as adverse economic and social effects and a lowering of the quality of life within some communities. Traditional community values which have been made up of life long residence, may be pressured to change. Outside values and new ideas brought in by workers may not blend well with the traditional deeply rooted values of local residents.

Upon completion of the development there would be a significant drop in the needed workforce, an out-migration of population can be expected. If services and facilities are provided to meet the needs of the development activities there is a possibility that local governments would have incurred large bond indebtedness to pay for facilities that would no longer be needed. The impacts from rapid CO_2 field development would be most significantly felt in communities such as Escalante that are characterized by a stable rural and tourist based economy where mineral based economies were previously absent. However, the development of the CO_2 would generate a sudden and sizable expenditure of capital. The economic sector would benefit immediately and create secondary employment.

Economic benefits to local communities could be significant. As an example, the cost of drilling one well is estimated to be $1.1 million. Some of this cost is returned to nearby communities as consumer spendable income. Other development activities would also be beneficial to the local economy.

One of the most significant economic effects would result from the royalties, lease rentals, and taxes from CO_2 production which accrue to State and local government units. These benefits would be more significant in sparsely populated areas with little or no previous mineral economic base.

Upon eventual depletion of the CO2 and abandonment of the field there would be an additional out-migration of workers but this would occur over an extended period of time and the impacts, although less sudden and severe, would extend into the realm of a long term impact. This would result in a degree of recession in the local economy which may be long term and result in a degree of economic hardship if an alternative economic base does not exist.

Alternative II (Environmental Consequences)

Soil Resource

This alternative would have approximately the same impacts on the soil resource as those described for Alternative I. However, there would be an additional 2,150 acres available for leasing. Soil disturbing activities would be associated with 13 additional well site locations and 15 miles of new or upgraded roads. Under this alternative, there would be a total of 195 acres taken out of production. The additional onsite soil erosion associated with this alternative over Alternative I would be minimal due to the gentle slopes and low runoff potential of the areas being made available for development in this alternative. Many of the additional acres taken out of production are non-commercial timber land or commercial timber land with very low productivity.

Wildlife and Fisheries Resources

Approximately 2,200 acres would be offered for lease under this alternative. If all the available lands were leased, a total of 26,200 acres would be under lease, as opposed to 23,659 acres under Alternative I. Approximately 48 miles of the proposed road system would be constructed under this alternative to drill an estimated 38 exploratory wells. As discussed under Alternative I, adverse impacts on wildlife would be directly proportionate to the miles of road and the number of drill pads constructed. Road densities over the entire leased portion of the KGS would exceed 3 miles per square mile of habitat. Impacts of these road densities have been discussed in Alternative I.

The unleased portions of Antone Bench and Exclusion Areas 2-5 would be leased under this alternative. It is estimated that there would be about 1 well every half mile in the Exclusion Areas. In combination with the road system and other attendant facilities (drill pads, pipelines, powerlines, compressor station, etc.) there would be very little room left in the Exclusion Areas for wildlife. Surveys would be required to determine the presence of threatened and/or endangered plant or animal species. If these species were found, protective measures possibly including avoidance of habitat areas would be required to assure continued existence of the species.

If the Exclusion Areas were developed they would probably no longer provide habitat for most species of wildlife that currently use the area, unless stringent mitigation measures were applied.

Visual and Recreational Resources

This alternative has the same impacts on the recreational and visual resources as were described in Alternative I. In addition, there would be impacts on Antone Bench and the Exclusion Areas. Antone Bench and Exclusion Area 2 would likely already have a road as was discussed in Alternative I. This alternative would also allow wells to be drilled along the Bench which would add to the disturbance of the road. These wells would be on pads approximately one-acre in size. The disturbance from the pad construction and the equipment on the pad would likely not meet the suggested visual objective of retention. Noise from equipment at the wells would affect the recreation experience of users in the adjacent Wilderness.

Exclusion Areas 3 and 5 would be available for lease under this alternative. Both of these areas are in the middleground zone visible from the Hells Backbone Loop Road. The recommended management objective for visual is retention of natural conditions. The development of access roads, pads, and gas lines would likely not meet this objective due to disturbance in the steep, rocky terrain.

The noise from development and operation on leases in Antone Bench and Exclusion Area 5 would further add to the disruption of the wilderness recreation experience of those using the Death Hollow Wilderness.

Water Resources

The impacts of this alternative would be essentially the same as those described for Alternative I. The additional wells and roads would be constructed at a distance from surface waters. There would, however, be one additional crossing of Lake Creek which might tend to increase the sedimentation in this stream. Water consumption in the area would be increased moderately over that in Alternative I.

Socio-Economic

As stated earlier, the difference between Alternative I and Alternative II is relatively small since a certain level of development could occur in Alternative I. Alternative II would make approximately an additional 2,151 acres of land available for leasing within the KGS. Potential for CO_2 development under this alternative is likely because known reservoirs of CO_2 have been discovered.

However, assuming gas development takes place on the additional leased lands, economic benefit and social impacts, as described in Alternative I, would increase. They are not expected to increase proportionately since development is already assumed on adjacent existing leases, but both positive and negative impacts would increase.

Alternative III (Environmental Consequences)

Soil Resource

Under this alternative, the same impacts as described under Alternative I would occur, however, an additional 13,423 acres would be available for lease. Soil disturbing activities would be associated with 28 additional well sites and 67 miles of new or upgraded roads. There would be a total of 219 acres taken out of production under this alternative. Many of these acres produce either commercial timber or high value range which would be lost to production.

The increased acreage available for leasing and development under this alternative is generally located in the northwest and north central part of the KGS, much of it on the Aquarius Plateau and other areas where slopes are more gentle and/or soils are more productive. These areas typically have much lower inherent soil erosion hazards than the area to the south. Portions of the new areas available for lease occur on soils that either contain gypsum or show evidence of slumping or landslides. Surface disturbing activities associated with road construction and development would increase onsite soil erosion, however, the increase should be within acceptable limits if areas with unstable soils were avoided or the impacts of construction were mitigated.

Wildlife and Fisheries Resources

About 13,423 additional acres would be offered for lease under this alternative. An estimated 67 miles of the proposed road network would be constructed or reconstructed. Approximately 54 wells could be drilled. All of the impacts described under Alternative II, in addition to the impacts of additional leasing for CO_2 and oil and gas north of the Hells Backbone Loop Road would be realized under this alternative.

Approximately 11,000 acres north of Hells Backbone Loop Road would be offered for lease under this alternative. Impacts on fish and wildlife in this area would be much the same as under Alternative I, but somewhat increased because of additional roading and well development. Because the existing leases are scattered throughout this area, most of the same road network used under Alternative I would be required under Alternative III. Most of the additional disturbance under this alternative would result from the well sites. As discussed in Alternative I, streams, lakes and wet areas would be disturbed by road crossings or the proximity of roads and by possible contamination from nearby well sites, in addition to the impacts created by increased fishing pressure.

Visual and Recreational Resources

This alternative would have the same impacts on the visual and recreational resources as Alternatives I and II. In addition to those impacts, the areas around Blue Spruce Campground and Roger's Peak in the central section of the KGS would also be leased. The area around the campground is represented by the Pine Creek drainage which has steep slopes coming down to a narrow bottom. The campground is small but is used heavily during the summer by fishermen and sightseers. Past timber activities have

constructed a number of roads and if it is possible to use those roads for development, the additional impact on the area would be slight. The movement of equipment through the campground would affect the desirability of the campground. The Roger's Peak area is steep and pine covered. Timber activity has developed sufficient roads in the area that new roads would not likely be needed for development. It would greatly reduce the impact and the area needed for gas development if the existing roads were utilized.

The Jacob's Reservoir and Boulder Swale area is rolling with spruce and large open brush cover. Past timber activity has left some primitive roads, and users have extended many of these through the openings. Development would open more areas to motorized vehicles and would likely encourage more use of the area by off road vehicles. Most of these areas have been recommended for modification or maximum modification for visual management. Most of the proposed activities would meet the criteria for these recommendations.

Water Resources

The effects of this alternative would be a very similar to those of Alternative I. The primary difference would be related to the larger scale of operations. The greater number of roads and drill sites would result in an increase in erosion and sedimentation rates. Water consumption needs would be almost twice those of Alternative I. An estimated four stream channel crossings in addition to those in Alternative I, would need to be constructed for full development under this alternative. This situation would result in a minor increase in riparian area impacts. The larger scale of the project would result in an increased risk of accidental contamination of surface waters.

Socio-Economic

This alternative would make an additional 13,423 acres available for leasing and if developed could add an additional 28 CO_2 wells in the KGS. The total number of wells that could be drilled under this development scenario would be 54. Under this alternative, it is estimated that another drilling crew would be brought in to assist the rigs and crews presently working if the KGS were to be developed. CO_2 rigs of the size expected to be used have approximately 15 crew members per rig and approximately 40 vehicles would be needed to haul the rig to the well site. Temporary and minor economic benefits would be felt in local lodging and food service businesses while the rig was being transported to the well site. Housing needs would increase temporarily while the drilling crew was working. Many of the crew members would require temporary housing which would probably be brought with them. As stated earlier, a minor increase in economic benefit and social impact would be noted.

In summary for all three alternatives for Socio-Economic consideration, adverse impacts are expected to be small while long term fixed revenues to the impacted counties and to the State promise to be quite beneficial.

Alternative IV (Environmental Consequences)

Soil Resources

Under this alternative, the same impacts described for Alternative III would occur, however, there would be 47,580 acres available for leasing, which are 10,498 acres more than in Alternative III. These additional acres have the same characteristics as described in Alternative III. There would be a total of 245 acres taken out of production under this alternative. As described in Alternative III, there would be an increase in onsite soil erosion and additional acres of unstable soils accessed, however, the amount of increased erosion should be within acceptable limits and the unstable soil areas could be avoided or mitigated.

Wildlife and Fisheries Resources

This alternative would offer all of the northern portion of the KGS, excluding the Wilderness, ISA, Antone Bench, and Exclusion Areas 2-5 for lease. Approximately 76 miles of the proposed road system would need to be upgraded or reconstructed. Approximately 60 wells could be drilled.

If the existing lease at the south end of Antone Bench were developed, a road would be constructed the length of the Bench. Although the impacts would not be as great as if wells were drilled every half mile down the Bench, the presence of the road and the traffic would be a source of disturbance to wildlife.

Impacts of developing the entire northern portion of the KGS would be similar to those discussed under Alternatives I and III, but increased because of the additional area being leased. As discussed above, the increased road density would decrease habitat effectiveness for big game species, including wide-ranging species such as cougar and bear. Habitat quality for all wildlife and fish species would be degraded by the increased road density.

Visual and Recreational Resources

This alternative has the same impacts as Alternatives I through III with the exception that development in Exclusion Areas 3 and 5 would not occur except on existing leases. In addition to these impacts, the northeast quarter of the KGS would be available for leasing. The southern portion of the area available for lease in this alternative is adjacent to the Hells Backbone Loop Road. Management activities in the foreground of this road should not be evident if they are to meet the requirements for visual management. Collection pipelines, roads, powerlines, and well sites located on the steep topography in this area would likely not meet the visual objectives. The collector pipeline along the Hells Backbone Loop Road would be larger in this alternative due to the increased potential for more wells. Construction equipment along the road would also increase creating more hazards for recreationists using the road.

The McGath Lake and Basin Flats areas are not visible from any of the major roads in the areas. However, the McGath Lake area is a heavily used dispersed recreation area. The Draft Forest Plan has indicated that this

area be managed for primitive recreation. Roads developed for construction would increase the accessibility of the area and would change the recreation experience.

Water Resources

The impacts of this alternative would be similar in nature and degree to those of Alternative III. Much of the additional area would already be roaded from timber sales and development of existing leases. There would be two additional stream crossings compared to Alternative III in the Grimes Creek-Lake Creek area. Other than localized increases in sedimentation within the added leaseholds, the differences in impacts would probably be less than the proportionate increase in acres leased or wells drilled.

Socio-Economic

Under this alternative an additional 23,921 acres would be available for leasing and an additional 34 wells could be drilled. However, the net increase in the number of wells drilled under this alternative as compared to Alternative III would be 6 wells. It is assumed that another drilling rig would be needed to drill the additional wells. However, no additional socio-economic impacts would be noticed that were not already analyzed under Alternative III, but the impacts described under Alternative III would be more long term under Alternative IV.

Alternative V (Environmental Consequences)

Soil Resources

Under this alternative, there would be a total of 49,731 acres available for lease. A total of 296 acres would be taken out of production. This alternative would add very little to the impacts identified under Alternative IV. There would be 2,150 additional acres available for lease over Alternative IV. These acres have low productivity and low erosion hazard.

Wildlife and Fisheries Resources

This is the maximum leasing alternative, and as such, has the potential for the maximum disturbance to wildlife. The entire proposed road system (91 miles) would be constructed or upgraded under this alternative. About 73 wells could be drilled under this alternative. This alternative is basically a combination of Alternatives II and IV. The impacts on wildlife would be a combination of the impacts discussed under those two alternatives.

Visual and Recreational Resources

This alternative has the impacts of Alternative IV plus the addition of the roads and wells in Exclusion Areas 3 and 5. Also, there would be the added impacts of the wells on Antone Bench.

The impact of total development would change the visual and recreational experience of the area.

Water Resources

The impacts of this alternative would be similar in nature and degree to those of Alternative IV. Much of the additional area would already be roaded from timber sales and development of existing leases. There would be two additional stream crossings compared to Alternative IV in the Grimes Creek-Lake Creek area. Other than localized increases in sedimentationwithin the added leaseholds, the differences in impacts would probably be less than the proportionate increase in acres leased or wells drilled.

Socio-Economic

This alternative allows for the maximum development of the KGS. A total of 49,731 acres could be made availabe for leasing if this alternative is chosen. A total of 73 CO_2 wells could be drilled under this alternative. Since no operating plan or plan of development has been submitted, the full socio-economic impacts can only be speculated at this time.

It is estimated that several rigs would be brought in to develop the CO_2 field. Approximately 15 additional people would be needed to operate each rig. More temporary housing would probably be brought in to house these these people. Some workers from Escalante and surrounding communities would probably be hired to work on the rigs lessening the demand for housing while increasing the economic benefit to the communities. Local merchants and contractors would notice economic benefits from the services required to support the additional drilling rigs and people.

Some adverse social impacts could be felt in the communities as people with new ideas and different lifestyles associate with community members that have traditional deeply rooted values. Escalante and surrounding communities experienced similar social impacts during the development of the Upper Valley Oil Field in the mid 1960's. It is anticipated that any economic benefits derived from development in the area would outweigh the anticipated adverse social impacts.

Other Considerations

Several factors were not evaluated under each alternative because the environmental consequences were considered to be the same under each alternative or management direction has been established by law.

1. Wilderness Resource

The Wilderness issue was not used as a criteria because the Box-Death Hollow Wilderness was designated by the Utah Wilderness Act and those National Forest System lands not designated as Wilderness were released for multiple use management. The Wilderness or Instant Study Area would not be directly affected by any of the proposed leasing alternatives.

2. Cultural Resources

In accordance with the National Historic Preservation Act of 1966, the Antiquities Act of 1906, and the Archaeological Resource Act of 1979, the Federal Surface Management Agency (SMA) must assure that operations on oil and gas leases under its jurisdiction are conducted with due regard for survey evaluation, and mitigation of disturbances to cultural resources. Identified cultural resource sites would be avoided whenever possible or when avoidance is not possible recovery of the cultural resource data would be undertaken. All cultural resource surveys for oil and gas operations in Utah are to be conducted in accordance with Notice to Lessees UT-01-85.

3. Threatened and Endangered (T&E) and Sensitive Species

It is not certain at this time what range these threatened or endangered plant or animal species may have within the KGS. Informal consultation regarding the presence of T&E species would be undertaken with the Fish and Wildlife Service prior to approval of any operations that could potentially affect these species. It is required that before any surface disturbance occurs which may adversely affect the continued existence of threatened or endangered species, a Section 7 consultation with the Fish and Wildlife Service be initiated and a site-specific survey be completed. Appropriate mitigating measures would be taken to protect any T&E species that may be adversly affected by the proposal.

4. Air Quality

The primary sources of emissions that could significantly affect air quality can be expected from 1) fugitive dust at construction sites and increased vehicle travel on unpaved roads, and 2) H_2S and other gases such as nitrous oxides and CO_2 that could be released from well sites, pipeline ruptures, and gas plant operations. Although the possibility exists that significant air quality impacts could occur, all operations would be required to comply with the Prevention of Significant Deterioration (PSD) Class II increments for H_2S and the Utah Ambient Air Quality Standards. Until a development operating plan is submitted and site locations are proposed the potential impacts to air quality cannot be thoroughly evaluated. Fugitive dust can be mitigated by graveling and paving roads and utilizing water suppression during construction activities.

5. Research Natural Areas (RNA's)

Presently, no RNA's exist within the KGS. During the scoping process, a possible RNA was identified. However, it was found that the area does not contain a unique vegetative pattern that cannot be found elsewhere.

6. Reclamation and Abandonment

Only those lands that have adequate reclamation potential would be allowed to be occupied. Bonds lease stipulations, site-specific evaluations of proposals, and conditions of approval attached to operating plans and special use permits would be used to assure that adequate reclamation of disturbed areas was undertaken. The Utah Wilderness Act of 1984, in

regards to CO_2 development of Antone Bench, requires that all roads or other facilities within the area be reclaimed to a condition of being "substantially unnoticeable".

7. Health and Safety

Hydrogen Sulfide (H_2S)

The primary concern for human health and safety would occur if H_2S were to be released into the environment in significant (harmful or lethal) amounts. The probability of a well blowout or a pipeline rupture would be critical in determining the possible effects from the presence of H_2S. Analysis of the potential effects of a blowout or rupture would need to be completed together with an analysis of gas plant operations.

However, because of its presence, an H_2S contingency safety plan including electronic monitoring and alarm systems, escape and area evacuation plans, safety equipment, etc., would be required at each drill site and at other facilities where potential H_2S hazards would exist. Any proposal for development of the CO_2 would be required to incorporate H_2S safety controls including monitoring and shutdown systems and emergency response procedures into the siting, design, and operation of any gathering and trunk pipelines and gas plants.

The potential impacts from H_2S cannot be properly evaluated until more is known as to the extent that H_2S occurs in association with the CO_2 siting proposals for wells, pipelines and gas plant facilities, topographic conditions, and prevailing meterological conditions. If a significant presence of H_2S is found by further drilling in association with the CO_2 a detailed analysis of the potential effects of H_2S on air quality and health and safety would need to be undertaken.

8. Noise

The major noise generating activities would be well drilling, construction activities, vehicular traffic, and the operation of compressors and processing equipment at the gas plant. The greatest amount of noise would be expected to be generated during the drilling and construction activities. Noise impacts from development of the CO_2 field and construction of the gas plant and pipelines would be insignificant at population centers. However, the town of Escalante would probably be affected by vehicular traffic especially by heavy trucks moving through town. Certain activities within Antone Bench, Areas 2 through 5, and on grandfathered leases within the Wilderness and ISA would be heard in those areas and detract from the Wilderness experience. Noise could also be expected to be disruptive to sensitive wildlife species. After completion of construction and development activities, production-related noise would be reduced significantly.

A site-specific analysis of the effects of noise would be undertaken when specific information as to site locations and types of activities is available.

The U.S. Environmental Protection Agency (EPA 1974) has established guidelines for noise levels requisite for the protection of public health and welfare. Long-term outdoor noise levels not exceeding 55 dBA are felt to provide for an adequate margin of safety. Noise in excess of this level would have significant impacts on the affected population.

Potential Conflicts With Other Resource Uses

There are two timber sales proposed in the KGS that are scheduled for 1990 and 1991. Approximately 3.4 million board feet of Engelmann spruce and subalpine fir in the Jacob's Valley timber sale are scheduled to be sold in 1990 and 3 million board feet of Engelmann spruce and subalpine fir are scheduled to sell in the Boulder Swale timber sale in 1991. The existing Spectacle Lake Road is scheduled to be upgraded to serve as a collector road for the two proposed timber sales. This road could be used by drilling rig trucks, service vehicles, and water trucks in the event that leasing, exploration, and development take place.

It is premature to try to analyze conflicts between logging traffic and CO_2 development traffic at this time. Timber sales of this size generally have a four-year contract commencing from the contract award date. Logging traffic can be expected to use this road off and on from 1990-1996. The areas expected to be leased, drilled, and developed in the timber sale areas during that timeframe cannot be predicted at this time. The additive effects of the timber sales to CO_2 development would be analyzed at a later date and addressed in the appropiate timber sale or development environmental assessment at the appropriate time.

Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources as used in this analysis is when the commitment cannot be changed once it occurs. An irretrievable commitment means that the resource cannot be recovered or reused. Except for Alternative I, the irreversible and irretrievable commitments of resources is the same for all alternatives, differing only in amounts or degree of commitment based on the level of leasing addressed under each alternative. The following irreversible and irretrievable commitments of resources were identified and are presented in Table 2 on the following page.

TABLE 2

Resource	Irreversible Commitment	Irretrievable Commitment
CO_2 and Oil and Gas	Yes	Yes
Air Quality	No	No
Soils	No	Yes
Vegetation	No	Yes
Visual	No	No
Cultural	Yes	Yes
Recreation	No	Yes
Wilderness	No	Yes
Timber	No	Yes
Wildlife	No	Yes

Short Term vs. Long Term Commitments

All alternatives considered contain short and long term commitments of resources. The short term commitments are related to the exploration and development of the CO_2 resources. The long term commitments are related to those activities associated with production of the CO_2 and beyond.

Most of the short and long term commitments would be mitigated by reclamation of disturbed lands to a productive condition. Committing more lands to CO_2 production through leasing would create additional short term and long term commitments of resources. An evaluation of the short and long term commitments is presented in Table 3 below.

TABLE 3

RESOURCE	SHORT TERM	LONG TERM
Air Quality	The emissions from CO_2 development and production would deteriorate the the existing air quality in the project area.	Upon depletion of the CO_2 and final reclamation of disturbed areas no effects on air quality should remain.
Soils	Soil erosion is expected to occur during and immediately following construction and until reclamation is completed.	Soils lost to erosion would affect long term productivity. Soil loss above the normal rates for an area would not be expected to continue after reclamation.
Vegetation	Vegetation would be lost during construction and operation of the CO_2 field. The loss would occur until final abandonment and reclamation.	Significant long term impairment of vegetative productivity following reclamation is not expected. Some reduction in long term vegetative productivity can be expected due to soil loss.
Visual	Significant visual impacts would exist through the life of the CO_2 field.	Significant visual impacts should be eliminated upon removal of structures and and reclamation of the landscape to a natural appearance.

Cultural	Disturbance or disruption of cultural sites would result in the loss of prehistoric data.	Same as short term.
Recreation	Short term recreation opportunities would be altered significantly by the large local demand from an increased population.	Following completion of construction, crowding of local areas and activities within the CO_2 field and Wilderness should diminish. Quality recreation opportunities should be restored.
Wilderness	The quality of the Wilderness experience would be decreased in the short term from activities adjoining the Wilderness and increased human use and presence in the Wilderness.	Reclamation of sites to substantially unnoticeable conditions and decreased activities after construction and production should reestablish Wilderness values.
Timber	Removal of timber to accommodate roads, well sites, and other facilities would be a temporary impact. Increased incidences of fire can be expected.	Long termed productivity would not be impaired.
Wildlife	The short term impacts to wildlife would be from loss of habitat, poaching, road kills, and a reduction in big game production.	Long term losses in wildlife productivity following reclamation and reduction of human activities are not expected to be significant.
Socio-Economic	Short term impacts would be two-fold. There would be a sudden increase in economic benefits accompanied by an increased demand for public services and an adverse effect on the quality of life and established values.	Long term economic benefits would accrue after construction is completed and continue through the life of the project as a result of increased employment and other economic benefits from resource production.

Carbon Dioxide	There would be a commitment of the CO_2 for immediate beneficial uses.	Carbon dioxide would not be available for future uses.

V. LIST OF PREPARERS

Interdisciplinary Team

Name	Qualifications		Occupation	Years of Experience
Brent Porter	B.S.	- Forestry	Supervisory Forester	13
Jim Probst	M.S.	- Water Resource Management	Hydrologist	8
James Bayer	B.S.	- Soil Science	Soil Scientist	19
Skip Griep	M.S. B.S.	- Wildlife - Zoology	Wildlife Biologist	15
Max Molyneaux	B.L.A.	- Landscape Architecture	Landscape Architect	16
Paul Dastrup	B.S.C.E.	- Engineer	Engineer	9

Other Forest Service Personnel Consulted

Duane Atwood, Zone Botanist
Tom Abbay, Zone Geologist, Regional Office
Benny Albrechtsen, Regional Office (Reclamation)
Bill Miller, Regional Office (Leasing)
Bill Sheehan, Minerals Specialist, Dixie NF
Ralph Rawlinson, Minerals Staff Officer, Dixie NF
Dave Dallison, District Minerals Staff, Dixie NF
Jerry Shaw, District Ranger, Teasdale RD, Dixie NF
Douglas Austin, District Ranger, Escalante RD, Dixie NF

VI. LIST OF AGENCIES, ORGANIZATION AND PERSONS CONSULTED

A scoping statement was sent to agencies, groups, and individuals that have indicated an interest in this area. Thirteen comments were received and used to identify issues, concerns, and opportunities. They were also used to evaluate potential alternatives and develop some mitigating measures that are carried forward as lease stipulation recommendations.

A copy of the Scoping Statement and Mailing List is included in Appendix D.

A news release was also published in the following newspapers:

Garfield County News
Cedar City "The Spectrum"
Richfield Reaper

Replies will be sent to each respondent along with a copy of the Decision Notice when it is finalized.

State Contact

John Baza
Petroleum Engineer
Division of Oil, Gas, and Mining,
Department of Natural Resources
State of Utah
355 West North Temple, Suite 350
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BLM Contacts

George Peternel, Escalante Resource Area Office
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APPENDICES

APPENDIX A

1. Matrix for Applying Special Lease Stipulations

2. Special Stipulations for Oil and Gas Leases

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2. Stipulation for Lands of the National Forest System Under Jurisdiction of the Department of Agriculture

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APPENDIX A

1. Matrix for Applying Special Lease Stipulations
2. Special Stipulations for Oil and Gas Leases

NOTE: The following matrix can be used by the line manager to determine which special stipulations should be recommended for inclusion in leases issued for any parcel of land.

In some cases more than one "no surface occupancy" stipulation is marked. The line manager should select the appropriate stipulation based on the surface resource needs.

Special stipulations to be recommended to the Bureau of Land Management as a condition of lease.

	Area/Environmental Condition	Primitive Rec. Areas	Retention & Part. Retention	Developed Rec. Sites	High Mass Failure Hazard	Steep Slopes=45% & Greater	Riparian Areas	Seasonal Wildlife Habitat	T&E & Sensitive Species Habitat	Administrative Sites	Unique Geological Land Forms 2/	Antone Bench 3/	Significant Cultural Area 1/	Culinary & Non Culinary Springs	All Areas
No	Stipulation Summary														
1.	No Surface occupancy - entire lease										X				
2.	Visual - road, structure, etc.		X	X											
3.	No occupancy - legal subdivision		X								X		X		
4.	No surface occupancy adjacent to road, river, trail, etc.		X	X			X							X	
5.	No drilling or storage near reservoirs, archaeological sites, etc.		X	X			X						X	X	
6.	Steep slope occupancy limitations					X									
7.	Seasonal occupancy limitations - Wildlife							X							
8.	Prohibit activity - muddy or wet periods														X
9.	Restricted trail/road														X
10	Visual - painting or camouflage	X	X	X								X			
11	No surface occupancy - (May replace #1, 3, and 6)			X	X	X				X	X			X	
12	No drilling, storage, surface disturb next to. . . (May replace #1, 4, and 5)		X	X			X			X			X		
13	No surface distrub., explor., drill . . . (May replace #7)	X				X		X	X						
14	Controlled or Limited Surface Use	X	X												
15	Activity Coordination	X						X	X						
16	Protection of T&E Species								X						X
	Conditions found in Sec. 306 of the Utah Wilderness Act of 1984											X			

1/ A cultural resource survey is required prior to surface disturbance.

2/ Prior to surface disturbance, slick rock portions of sand creek drainage located east of Hells Backbone Bridge.

3/ Antone Bench and Exclusion Areas 2, 3, 4, and 5 as designated by the Utah Wilderness Act.

Special Stipulations for Oil and Gas Leases

The following special stipulations may be used to supplement the terms and conditions of the lease form, and are necessary to protect specific resource values on the lease area. If found to be in the public interest, these stipulations may be made less restrictive when specifically approved in writing by the authorized officer, Bureau of Land Management, with the concurrence of the Federal surface management agency.

1. All of the land in this lease is included in (recreation or special area, etc.). Therefore, no occupancy or disturbance of the surface of the land described in this lease is authorized. The lessee, however, may exploit the oil and gas resources in this lease by directional drilling from sites outside this lease. If a proposed drilling site lies on land administered by the Bureau of Land Management, or by the Forest Service, a permit for use of the site must be obtained from the BLM District Manager or the Forest Service District Ranger, before drilling or other development begins.

2. No access or work trail or road, earth cut or fill, structure or other improvement, other than an active drilling rig, will be permitted if it can be viewed from the (road, lake, river, etc.).

3. No occupancy or other activity on the surface of (legal subdivision) is allowed under this lease.

4. No occupancy or other surface disturbance will be allowed within _______ feet of the ________ (road, trail, river, creek, canal, etc.). This distance may be modified when specifically approved in writing by the authorized officer, Bureau of Land Management, with the concurrence of the Federal surface management agency.

Recommendations:
400' from non-culinary spring sources.
600' from Hells Backbone Bridge.
1000' from culinary sources.
500' from riparian areas.

5. No drilling or storage facilities will be allowed within _______ feet of (live water, the reservoir, the archaeological site, the historical site, the paleontological site, etc.) located in (legal subdivision). This distance may be modified when specifically approved in writing by the authorized officer, Bureau of Land Management, with the concurrence of the Federal surface management agency.

Recommendations:
1000' from culinary sources.
600' from non-culinary sources.

6. No occupancy or other surface disturbance will be allowed on slopes in excess of 45 percent, without written permission from the authorized officer, Bureau of Land Management, with the concurrence of the Federal surface management agency.

7. In order to (minimize watershed damage, protect important seasonal wildlife habitat, etc.) exploration, drilling, and other development activity will be allowed only (during the period from ________ to ________, during dry soil periods, over snow cover, on frozen ground). This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by the authorized officer, Bureau of Land Management with the concurrence of the Federal surface management agency.

8. In order to minimize watershed damage, during muddy and/or wet periods, the authorized officer of the Federal surface management agency, through the authorized officer, of the Bureau of Land Mangement, may prohibit exploration, drilling, or other development. This limitation does not apply to maintenance and operation of producing wells.

9. The ______________________ (Trail/Road) will not be used as an access road for activities on this lease, except as follows: (No exceptions, weekdays during recreation season, etc.).

10. To maintain esthetic values, all semi-permanent and permanent facilities may require painting or camouflage to blend with the natural surroundings. The paint selection or method of camouflage will be subject to approval by the authorized officer of the Bureau of Land Management, with the concurrence of the Federal surface management agency.

11. No occupancy or other activity on the surface of the following described lands is allowed under this lease:

Reasons for this restriction are:

Examples of appropriate reasons for this restriction are:

1. Steep slopes.
2. Specific ecosystem, ecological land unit, land type or geologic formation which presents hazards such as mass failure.
3. Special management units such as: Recreation Type I, water supply, administrative site, etc.

Approximately ____% of lease.

Note: This stipulation can be used in place of Stipulation Nos. 1, 3, and 6.

12. No _________ will be allowed within _____ feet of the ____________. This area contains _________ acres and is described as follows:

Reasons:

First blank to be filled in with one or more of the following: drilling, storage facilities, surface disturbance, or occupancy. Second and third blanks to be filled in with one or more of the following:

1. ____ feet wildlife habitat essential to specific species.
2. ____ feet peripheral or unique vegetative type.
3. 200 feet either side of centerline of roads or highways.
4. 500 feet of normal high waterline on all streams, rivers, ponds, reservoirs, lakes.
5. 600 feet of all springs.
6. 400 feet of any improvements.

Note: Stipulation No. 12 can be used in place of Stipulation Nos. 4 and 5.

13. In order to (minimize) (protect) ______________________________, ____ will be allowed only during ____________________________________. This does not apply to maintenance and operation of producing wells and facilities. Lands within leased area to which this stipulation applies are described as follows:

Reason:

First blank to be filled in with one or more of the following:

1. Watershed damage.
2. Soil erosion.
3. Seasonal wildlife habitat (winter range, calving/lambing area, etc.).
4. Conflict with recreation.

Second blank to be filled in with one or more of the following:

1. Surface disturbing activities.
2. Exploration.
3. Drilling.
4. Development.

Third blank to be filled in with one or more of the following:

1. Period from _________ to _________.
2. Dry soil periods.
3. Over the snow.
4. Frozen ground.

Note: Stipulation No. 13 can be used in place of Stipulation No. 7, giving greater definition as to restriction.

14. Controlled or Limited Surface Use Stipulation. This stipulation may be modified when specifically approved in writing by the authorized officer, Bureau of Land Management, with concurrence of the Federal surface management agency. Distances and/or time periods may be made less restrictive depending on the actual on ground conditions.

The lessee/operator is given notice that all or portions of the lease area may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Any surface use or occupancy within such special areas will be strictly controlled. Use or occupancy will be authorized only when the lessee/operator demonstrates that the special area is essential for operations in accordance with a surface use and operations plan which is satisfactory to the BLM and Federal surface management agency for the protection of such special areas and existing or planned uses. Appropriate modifications to imposed restrictions will be made for the maintenance and operation of producing oil and gas wells; however, in extremely critical situations, occupancy may only be allowed in emergencies.

After the Federal surface management agency has been advised of specific proposed surface use or occupancy on these lands, and on request of the lessee/operator, the agency will furnish more specific locations and additional information on such special areas which now include:

Description:

Reason for Restriction:

Duration of Restriction: (year-round, months)

15. Activity Coordination Stipulation. This lease includes lands within ______________ which has resource values sensitive to high levels of activity. In order to minimize impacts to these resources, special conditions, such as unitization prior to approval of operations, and/or other limitations to spread surface disturbance activities over time and space may be required prior to approval and commencement of any operations on the lease.

Visually sensitive areas, Areas of Threatened and Endangered Species.

16. Protection of Endangered or Threatened Species. The Federal surface management agency is responsible for assuring that the area to be disturbed is examined, prior to undertaking any surface-disturbing activities on lands covered by this lease, to determine effects upon any plant or animal species listed or proposed for listing as endangered or threatened, or their habitats. If the findings of this examination determine that the operation may detrimentally affect an endangered or threatened species, some restrictions to the operator's plans or even disallowances of use may result.

The lessee/operator may, at his descretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the surface management agency. An acceptable report must be provided to the surface management agency identifying the anticipated effects or the proposed action on endangered or threatened species or their habitat.

APPENDIX B

1. Standard Lease Form (BLM Form 3100-11* (March 1984) *Formerly 3110-1, 2, 3, 3120-1, 7, 3130-4, 5, and 7)
2. Stipulation for Lands of the National Forest System Under Jurisdiction of Department of Agriculture

Form 3100-11*
[illegible] 1984)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0008
Expires January 31, 1986

Serial No.

OFFER TO LEASE AND LEASE FOR OIL AND GAS

The undersigned (reverse) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Mineral Leasing Act of 1920 (30 U.S.C. 181 et seq.), the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351-359), the Attorney General's Opinion of April 2, 1941 (40 OP. Atty. Gen. 41), or the

Read Instructions Before Completing

1. Name

Street

City, State, Zip Code

---

2. This offer/lease is for: (Check Only One) ☐ PUBLIC DOMAIN LANDS ☐ ACQUIRED LANDS (percent U.S. interest ____________)

Surface managing agency if other than BLM: ______________________ Unit/Project ______________________

Legal description of land requested:

T.	R.	Meridian	State	County

Total acres applied for ____________

Amount remitted: Filing fee $ ____________ Rental fee $ ____________ Total $ ____________

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T.	R.	Meridian	State	County

Total acres in lease____________

Rental retained $____________

In accordance with the above offer, or the previously submitted simultaneous oil and gas lease application or competitive bid, this lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (except helium) in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this le[illegible] Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights g[illegible] specific provisions of this lease.

Type and primary term of lease:

☐ Simultaneous noncompetitive lease (ten years)

☐ Regular noncompetitive lease (ten years)

☐ Competitive lease (five years)

☐ Other ______________________

THE UNITED STATES OF AMERICA

by ______________________
(Signing Officer)

______________________ (Title) ____________ (Date)

EFFECTIVE DATE OF LEASE ______________________

4. (a) Undersigned certifies that (1) offeror is a citizen of the United States; an association of such citizens; a municipality; or a corporation organized under the laws of the United States or of any State or Territory thereof; (2) all parties holding an interest in the offer are in compliance with 43 CFR 3100 and the leasing authorities; (3) offeror's chargeable interests, direct and indirect, in either public domain or acquired lands do not exceed 200,000 acres in oil and gas options or 246,080 acres in options and leases in the same State, or 300,000 acres in leases and 200,000 acres in options in either leasing District in Alaska; and (4) offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located.

[illegible] dersigned agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions, and stipulations of which offeror has been given notice, and any amendment [illegible] te lease that may include any land described in this offer open to leasing at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this [illegible] nnot be withdrawn, either in whole or part, unless the withdrawal is received by the BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Duly executed this ________ day of ______________________________, 19 _____. ______________________________

(Signature of Lessee or Attorney-in-fact)

LEASE TERMS

Sec. 1. Rentals—Rentals shall be paid to proper office of lessor in advance of each lease year. Annual rental rates per acre or fraction thereof are:

(a) Simultaneous noncompetitive lease, $1.00 for the first 5 years, thereafter, $3.00;
(b) Regular noncompetitive lease, $1.00;
(c) Competitive lease, $2.00; or
(d) Other, see attachment.

If all or part of a noncompetitive leasehold is determined to be within a known geological structure or a favorable petroleum geological province, annual rental shall become $2.00, beginning with the lease year following notice of such determination. However, a lease that would otherwise be subject to rental of more than $2.00 shall continue to be subject to the higher rental.

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a well capable of producing leased resources, and the plan contains a provision for allocation of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due at the rate specified in (a), (b), (c), or (d) for those lands not within a participating area.

Failure to pay annual rental, if due, on or before the anniversary date of this lease (or next official working day if office is closed) shall automatically terminate this lease by operation of law. Rentals may be waived, reduced, or suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties—Royalties shall be paid to proper office of lessor. Royalties shall be computed in accordance with regulations on production removed or sold. Royalty rates are:

(a) Simultaneous noncompetitive lease, 12½%;
[illegible]) Regular noncompetitive lease, 12½%;
[illegible] Competitive lease, see attachment; or
[illegible]) Other, see attachment.

Lessor reserves the right to specify whether royalty is to be paid in value or in kind, and the right to establish reasonable minimum values on products after giving lessee notice and an opportunity to be heard. When paid in value, royalties shall be due and payable on the last day of the month following the month in which production occurred. When paid in kind, production shall be delivered, unless otherwise agreed to by lessor, in merchantable condition on the premises where produced without cost to lessor. Lessee shall not be required to hold such production in storage beyond the last day of the month following the month in which production occurred, nor shall lessee be held liable for loss or destruction of royalty oil or other products in storage from causes beyond the reasonable control of lessee.

Minimum royalty shall be due for any lease year after discovery in which royalty payments aggregate less than $1.00 per acre. Lessee shall pay such difference at end of lease year. This minimum royalty may be waived, suspended, or reduced, and the above royalty rates may be reduced, for all or portions of this lease if the Secretary determines that such action is necessary to encourage the greatest ultimate recovery of the leased resources, or is otherwise justified.

An interest charge shall be assessed on late royalty payments or underpayments in accordance with the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) (96 Stat. 2447). Lessee shall be liable for royalty payments on oil and gas lost or wasted from a lease site when such loss or waste is due to negligence on the part of the operator, or due to the failure to comply with any rule, regulation, order, or citation issued under FOGRMA or the leasing authority.

Sec. 3. Bonds—Lessee shall file and maintain any bond required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage—Lessee shall exercise reasonable diligence in developing and producing, and shall prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 5. Documents, evidence, and inspection—Lessee shall file with proper office of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed and sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may [illegible] required to provide plats and schematic diagrams showing development work and im[illegible]vements, and reports with respect to parties in interest, expenditures, and depreciation costs. [illegible] the form prescribed by lessor, lessee shall keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection by any authorized [illegible] er of lessor [illegible] leased premises and all wells, improvements, machinery, and fixtures thereon, [illegible] all [illegible] s, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessee shall maintain copies of all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that supports costs claimed as manufacturing, preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting offices for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations—Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-ways. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations—To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of such operations.

Sec. 8. Extraction of helium—Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessee or owner of the gas. Lessee shall include in any contract or sale of gas the provisions of this section.

Sec. 9. Damages to property—Lessee shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity—Lessee shall: pay when due all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of the public.

Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns controlling interest in a pipeline or a company operating a pipeline, which may be operated accessible to oil derived from these leased lands, lessee shall comply with section 28 of the Mineral Leasing Act of 1920.

Lessee shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractors shall maintain segregated facilities.

Sec. 11. Transfer of lease interests and relinquishment of lease—As required by regulations, lessee shall file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 12. Delivery of premises—At such time as all or portions of this lease are returned to lessor, lessee shall place affected wells in condition for suspension or abandonment, reclaim the land as specified by lessor and, within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells.

Sec. 13. Proceedings in case of default—If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease shall be subject to cancellation. Lessee shall also be subject to applicable provisions and penalties of FOGRMA (96 Stat. 2447). However, if this lease includes land known to contain valuable deposits of leased resources, it may be cancelled only by judicial proceedings. This provision shall not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver shall not prevent later cancellation for the same default occurring at any other time.

Sec. 14. Heirs and successors-in-interest—Each obligation of this lease shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors, beneficiaries, or assignees of the respective parties hereto.

The following stipulation is attached to all oil and gas leases which involve National Forest System lands.

STIPULATION FOR LANDS OF THE NATIONAL FOREST SYSTEM UNDER JURISDICTION OF DEPARTMENT OF AGRICULTURE

The licensee/permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights granted by the Secretary of the Interior in the license/prospecting permit/lease. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the NFS prior to approval of a permit/operation plan by the Secretary of the Interior, (2) uses of all existing improvements, such as Forest development roads, within and outside the area licensed, permitted or leased by the Secretary of the Interior, and (3) use and occupancy of the NFS not authorized by a permit/operating plan approved by the Secretary of the Interior.

All matters related to this stipulation are to be addressed

to: Forest Supervisor, Dixie National Forest
82 North 100 East
P.O. Box 580
Cedar City, UT 84720

Telephone: (801) 586-2421

who is the authorized representative of the Secretary of Agriculture.

Signature of Licensee/Permittee/Lesssee

APPENDIX C

1. Mitigating Measures Recommended by the Interdisciplinary Team
2. Road Design Standards

Mitigating Measures Recommended by the Interdisciplinary Team

Mitigation Requirements

1. Locate development to blend with the natural landscape.

2. Roll the roads with the topography to reduce cuts and fills.

3. Material used for surfacing roads in the Antone Bench should be the same color as existing soil.

4. Use non-reflective material for all metals used where they may be seen from the major roads.

5. Color metal buildings to blend with colors found naturally within the area. Also use color to break up the solid shapes of the buildings.

6. Scatter rock and other debris along pipelines to break away linear patterns that may identify the pipelines to the Forest visitor.

7. Feather corridor edges along rights-of-way so they do not appear as straight lines.

8. Revegetate all corridors to native grass and shrubs.

9. Color all exposed pipelines that are visible from major roads to blend with natural colors in the area.

10. Where pipelines and powerlines cross major roads, make turns in the lines to prevent long straight corridors.

11. Seed disturbed areas (cut and fill slopes, pipeline corridors, etc.) with appropriate seed mix and application rate. (To be determined by wildlife biologist and range conservationist.) Seed mix will differ by vegetation zone and elevation.

12. Design adequate drainage into all constructed roads (water bars, rolling dips, culverts, etc.).

13. To the extent possible, avoid constructing roads and drill pads on or across areas showing evidence of past land instability (slumps, landslides) and areas of geologic formations showing evidence of gypsum, particularly where water may be intercepted. If roads, drill pads, etc., must be constructed on such areas, minimize resource damage by either (1) filling rather than cutting across the area, or (2) making only minimum sized cuts.

14. Protection of threatened, endangered, or sensitive species. Prior to any surface disturbing activity, a survey must be accomplished to determine presence of and effects upon any plant or animal species listed or proposed for listing as threatened or endangered, or their habitats. Similar survey work should be done for species considered as sensitive by the Forest Service and/or the Utah Division of Wildlife Resources. A list of

threatened, endangered, and sensitive species which may occur within or near the KGS is attached to this report.

15. All road, drill pad and other facility location and design will be subject to approval by the Forest Service.

16. All new roads and existing roads which are providing access primarily for exploration or development activities should be closed to public use.

17. All facilities (including roads) that are not needed for the production phase should be reclaimed to as near the natural conditions as possible.

Road Design Standards

Escalante KGS

Objectives

The roads planned in the KGS would initially serve as access for exploration and if the field is developed would provide access for operating and maintaining the field.

During the exploration phase, the roads must be capable of transporting the drill rig, materials used while drilling, and the workers necessary to operate the drilling equipment.

These roads should be planned, designed, and constructed to a minimum standard necessary to meet these objectives. The design vehicle to be used for planning and design should be a tractor/trailer combination with a trailer 50 feet long and 8.5 feet wide.

Location and Design

The roads should be located and designed so as to cause minimal impact and still meet the objectives.

Guidelines for road design and layout are outlined in the following Road Design Standards.

1. Roadway Template and Dimensions

a. Single lane. Traffic volumes would be low enough that single lane would be sufficient on most roads.

b. Outslope. Most roads should be constructed as an outslope road. However, this should be considered on a case-by-case basis and ditch sections sould be constructed when soils, grades, and slopes dictate.

c. Subgrade width. Minimum subgrade width should be 14 feet.

2. Curve Widening

Curve widening should be included in the design and should be sufficient to accommodate the design vehicle.

3. Turnouts

Turnouts should be located on blind curves to minimize the safety hazard of mixed traffic.

4. Slope Ratios

a. Fill slopes. Fill slopes should be designed on a 1½:1 to provide for a stable roadbed.

b. Cut slopes. Cut slopes will vary depending on soil types and sideslope.

- Vertical cut slopes would be used where roads are constructed across solid rock.
- 1:1 cut slopes would be used on outslope roads where minimal sloughing is expected.
- 1½:1 cut slopes should be used on roads using a ditched template so as to minimize maintenance costs due to sloughing banks.

5. Horizontal/Vertical Alignment

a. Horizontal alignment should be located to follow the contour and minimize the amount of cuts and fills - minimum radius should be 60 feet.

b. Vertical Alignment. Grades should be rolled where possible to provide adequate drainage and minimize cuts and fills. Where sustained grades are required, grades should not exceed 8% unless special design considerations such as surfacing and ditching are used. Short pitches up to 15% may be considered but these should not exceed 200 feet in length and proper drainage should be provided. These are maximums and should be considered on a case-by-case basis, depending on soils, drainage, and cross slope.

6. Clearing and Grubbing

Clearing limits for the road right-of-way should be from the top of the cut to the toe of the fill, or a minimum of 2 feet beyond the road shoulder. This should provide adequate clearing to maintain the roadway shoulder.

Slash should receive complete disposal to avoid slash concentrations and minimize visual impacts.

7. Drainage

Dips should be used on outsloped roads and should be placed at intervals sufficient to minimize the erosion potential. Spacing should be considered on a case-by-case basis depending on soils and grade.

Live streams will be crossed with pipe structures. This will minimize the impact on the streams and provide for a stable road bed. Bridges should be considered where span, flow rate, etc., dictate.

Ditch relief culverts should be spaced at proper intervals where inslope/ditch template is required.

8. Aggregate Surfacing

Where subgrade soils are not of sufficient strength to accommodate the anticipated traffic a surface coarse should be applied to provide adequate strength. A surface coarse can also be used to provide an "all-weather" surface and can also be placed on the steeper grades to increase traction.

Either pit run or crushed aggregate could be used depending on availability of material, quality of material available, and traffic. Load vs. soil strength analysis and sources should be approved on a case-by-case basis.

9. Location and Design

Roads should be located so as to avoid slopes over 45%. Roads constructed on slopes over 45% require large cuts and fills which may create adverse visual impacts and stability problems.

Wet areas should be avoided wherever possible. Wet areas create road stability problems which cause rutting and erosion problems. When wet areas must be crossed, proper engineering measures must be followed to minimize impacts.

Roads located on flat rocky ground will require borrow construction to provide a stable road prism above the natural ground surface to eliminate the problem of creating a ditch.

A P P E N D I X D

1. Scoping Analysis
2. Scoping Document
3. Mailing List

Scoping Analysis

Leasing Recommendations for Escalante Known Geological Structure (KGS)

Project Name. USFS recommendations to BLM on Oil and Gas, and CO2 Leases on the Escalante KGS, National Forest system lands

Size. Approximately 65,000 Acres of NF land

Timing. FS Recommendations needed by 1/1/86

Who wants the Environmental Analysis? BLM has been asked by industry to issue competitive leases and needs the Regional Forester's recommendations for stipulations to lease or for no lease. Issuance of leases by the BLM is a Federal action which requires an environmental analysis to be in conformance with the National Environmental Policy Act of 1969 (NEPA), its implementing regulations (40 CFR 1500-1508), and agency direction. The Interagency Agreement between BLM and the FS for Mineral Leasing signed 06/19/84, establishes the policy and procedures by which the proposed for competitive leasing in the Escalante KGS will be processed. Wherein the leasing proposal primarily involves the National Forest System lands and NFS issues the FS will have the lead for environmental analysis and documentation for the leasing document.

Who is Responsible Official? A BLM official is the responsible official for the actual lease issuance. However, the Regional Forester is the responsible official for the USFS recommendations to lease with stipulations proposed to cover any disturbance of the surface resource if leasing is decided by the Secretary of Interior.

Existing Documents that address activities within the Area (KGS):

Utah Wilderness Act of 1984
Boulder Land Use Plan
Aquarius Land Use Plan
Escalante R.D. Oil and Gas Environmental Assessment
Dixie N.F. Proposed Forest Plan and Draft Environmental Impact Statement
BLM's Environmental Analysis Documents (coordination)

Characteristics of the Proposed Action. This action will not directly impact the land or other natural resources on the KGS. The purpose of the analysis and the decision is to recommend if Oil and Gas, or CO2 is offerred or not; and if a lease is offerred, what the protective stipulations will be. Issuance of a lease will not impact the land or resources; however, since the lease grants a right to explore and develop the resource leased, the lease recommendations and stipulations should consider the reasonable effects of the exploration and development.

There is no assurance at this point that a lease will be offered or granted or that exploration or development will occur. The costs of meeting the lease stipulations and the amount of land placed in the no lease category,

and the other costs of producing the resource compared to the price and quantity of what can be produced, will determine if there will be exploration and development.

Possible Environmental Effects. The environmental analysis should consider the following environmental effects that might occur if the leases are developed.

a. Physical Environment: geology and minerals, soils, air quality, water quality and quantity.

b. Biological Environment: vegetation, wildlife and fish.

c. Cultural Environment: archaeological and historical, research natural areas.

d. Socio-Economic Environment: Wilderness and unroaded areas, recreation, land use, transportation, energy use, livestock grazing, minerals and energy development.

e. Human Health and Welfare: safety, fire hazard, noise, scenic beauty.

f. Other factors: short term uses vs. long term productivity, adverse effects which cannot be avoided, irreversible and irretrievable commitment of resources, wetlands and floodplains, indirect effects, and cumulative impacts.

Public Involvement. In September of 1985, the Forest sent an announcement of the proposed action and requested public comments. Those contacted can be found listed in the scoping document, also found in the appendix.

A public notice was given to the following Newspapers:

Cedar City Spectrum
Richfield Reaper
Garfield County News

A total of 13 public letters were received during the comment period. Letters were received from the following:

1. The Nature Conservancy
2. Sierra Club Southwest Office
3. Sierra Club Utah Chapter
4. Rocky Mountain Oil and Gas Association
5. Utah Wilderness Association
6. Mid-Continent Oil Association
7. AMOCO Production Company
8. State of Utah Natural Resource Parks & Recreation
9. State of Utah Natural Resource Wildlife Resources
10. Exxon Company

11. Southwest Resource Council
12. SOURCE
13. National Parks and Conservation

Analysis of Comments Received

Our analysis of the comments resulted in three categories that each comment could fit. The three categories are:

- Outside the scope of this analysis
- A comment on the process only
- Suggested public issues

1. Comments that are outside the scope of this analysis were:

    a. Provide a detailed analysis of the quality and quantity of the commercial deposit.
    b. Determine the ability of the operator to perform.
    c. Compare the economic value of the wildlands vs. the value of the mineral deposit.
    d. Issue leases only to those who can establish commercial quantities.

The reason why these comments are outside this analysis economic analysis comes later in the process after the mitigating requirements have been determined.

2. Comments that pertain to the mechanics of the process only are:

    a. Limit the analysis only to areas excluded from the Box-Death Hollow Wilderness in the Act of 1984.
    b. Use existing NEPA documents for the remainder of KGS.
    c. BLM says the area is suitable for competitive leasing.
    d. Need an EIS.
    e. Decision should be made in Forest Plan or Land Use Plans.
    f. Distribute a draft Environmental Assessment.
    g. There are already adequate provisions for CO2 leasing in the 1984 Wilderness Act for exclusion areas 1 to 5.
    h. The period for public comment was too short.
    i. Send copy of the proposal when available.
    j. Send maps.

The reasons why these comments were process related are:

a. Not public issues - relate to an administrative process.
b. Purpose of an EA is to determine if an EIS is needed.

3. Comments that were considered as public issues to be adopted or not adopted were:

Adopt

a. Inventory wildlife and archaeological values to determine trade offs (display the effects on wildlife and archeology values in each alternative).
b. Must be able to reclaim to substantially unnoticeable condition (use as a criteria to trigger the use of protective stipulations or no lease).
c. Need an alternative to retain unimproved lands in natural state. (A no lease alternative will do this.)
d. Use no lease alternative to protect natural and watershed values. (Use a no lease alternative or an alternative with protective stipulations.)
e. Determine the effects of additional roads. (Display the effects of additional roads in each alternative.)
f. Protect sensitive, threatened and endangered species. (Display the effects on sensitive, threatened and endangered species.)
g. Noise from exploration and development could become a problem. (Display the effects of noise in each alternative.)
h. Exploration and Development can adversely affect both surface water, ground water and the quality and supply. (Display the effects on water quality and quantity in each alternative.)
i. Protect wildlife habitat and security and backcountry fishing waters from improved road access. (Display the effects of additional roads on wildlife and fishing.)
j. Protect scenic values from exploration and development activities. (Display the effects on scenic values in each alternative.)
k. Recognize and protect a productive industry and expand the economic base. (Consider the effects of each alternative on restricting the exploration and development of mineral and energy resources.)
l. Remove CO2 by pipeline along existing roads and corridors. (Use this comment in the scenario as the method used to remove CO2 and oil and gas products.)
m. Adequate provisions for leasing is contained in the 1984 Utah Wilderness Act for Antone Bench and Areas 2-5. (Provide at least one alternative that contains just Wilderness Act Provisions for mitigating requirements or stipulations.)

Don't Adopt

a. Protect two potential RNA's by no surface occupancy stipulations. (Too late to take on lengthy job of RNA suitability, need, or want; also most lease areas are not developed or disturbed.)
b. Develop only the less environmentally sensitive areas of the field, (not needed as an issue---this is what our stipulation, and no lease will do.)
c. Don't use no lease alternative because of hardship, (hardship is not a valid criteria to not use an otherwise viable alternative.)

d. A "Worst Case Analysis" is needed for each alternative. (One scenario will be created that all alternatives will be based on. That scenario should be "realistic", "reasonable", and describes full development of the CO2 and oil and gas resource.)

The above list of adopted public issues were combined into the following list of issues, and concerns that will be the basis for the Evaluated Analysis.

1. Evaluate a no lease alternative.
2. Evaluate and display the following effects in each alternative: Wildlife, archaeology, increased road access on wildlife security and fishing, threatened and endangered and sensitive species, noise disturbance, surface and subsurface water quality and quantity, scenic values, and restrictions to mineral industry.
3. Allow disturbance on only reclaimable areas.
4. Evaluate at least one alternative that contains just Wilderness Act Provisions.
5. Coordinate leasing recommendations with BLM recommendations on their part of KGS.

Interdisciplinary Needs. Based on the list of issues and concerns, and the possible environmental effects, an interdisciplinary team should be formed. The team members should be knowledgeable of the possible effects. An engineer should be included.

Analysis Criteria. The Interdisciplinary Team should follow the below listed criteria when making the environmental analysis:

1. Describe a hypothetical scenario of exploration and development for the FS portion of the KGS so the Interdisciplinary Team can use that to describe the environmental consequences.
2. The scenario should be tempered by experience from other developing fields; i.e., it should be realistic and assume that a CO2 field and pipeline, and oil and gas field will be explored and developed.
3. The environmental analysis should develop mitigating requirements not stipulations. Stipulations are developed to meet the mitigating requirements listed in the EA.
4. Do not analyze the wilderness area - the 1984 Act requires No Lease.
5. Analyze the five exclusion areas separate from the remainder of the KGS.

    a. Can only be leased for CO2 not for oil and gas.
    b. The no lease alternative is viable.
    c. All leases must have stipulations to cover provisions (a) (1) and (2) of the 1984 Act.
    d. Other stipulations may be necessary to cover mitigating requirements in addition to those in the Act.

6. Analyze the Antone Bench exclusion area separate (in addition to the above)

a. All leases must have stipulations to cover provisions (a) (3) (b) (1) (8) of the Act.
b. Other stipulations could be added, if needed, to cover mitigating requirements in addition to those in the act.

Possible Alternatives. Based on other actions of this type, there are only three basic choices for formulating alternatives. They are:

1. No Lease (No Action Alternative).
2. Lease with Standard Stipulations.
3. Lease with Standard and Special Stipulations.

Public Notice
Scoping Statement
Recommendation
LEASING
DIXIE NATIONAL FOREST

I. PROPOSED FEDERAL ACTION

The Forest Service is preparing leasing recommendations to the Bureau of Land Management on all presently unleased tracts of land within the known Geologic structure (KGS) area on the Escalante and Teasdale Ranger Districts, Dixie National Forest.

Several tracts of lands within the KGS are presently under lease. Consideration will be given to these areas for future lease action at the time of renewal.

For reference location of the KGS, refer to the enclosed map.

The area within the Box-Death Hollow Wilderness will be subject to the Utah Wilderness Bill (PL98-428).

An Environmental Assessment is now being prepared to address the recommendation to the BLM concerning leasing of the KGS area.

I. ISSUES, CONCERNS, AND OPPORTUNITIES

The following are anticipated Issues, Concerns, and Opportunities which were identified by the Interdisciplinary Team.

A. Geologic Stability

Discussion: What impacts will occur as a result of exploration or drilling activity on the identified geologic sensitive areas?

B. Wildlife

Discussion: What impacts will occur to wildlife habitat, security areas, or other wildlife qualities?

C. Visual Quality

Discussion: Some unique visual qualities exist in the KGS, how will these be impacted?

D. Economic Benefit

Discussion: What effects will be realized by State and Local communities? What benefit will be realized by increased ability to recover oil products?

E. Dispersed Recreation

Discussion: How will dispersed recreation in the KGS be affected?

F. Cultural Resources

Discussion: What cultural resources now exist? Can they be protected?

III. ALTERNATIVES

The following alternatives will be evaluated in the environmental assessment, other alternatives may be added as a result of public imput.

A. Recommend no leasing (no action alternative).

B. Recommend issuance of lease on areas where the impact of drilling will be acceptable or mitigatable when restricted by the standard lease stipulations.

C. Recommend issuance of lease on areas where the impacts of drilling will be acceptable or mitigatable when restricted by the standard lease stipulation and special stipulations.

IV. SCHEDULING

The Environmental Assessment is scheduled to be completed on July 11, 1986. Comments from public, concerned organizations, and Federal, State, and Local government bodies must be received on or before August 26, 1985, to be used in developing the assessment.

V. PUBLIC PARTICIPATION

Your help in identifying issues, other alternatives, or mitigating measures will be appreciated. Send written comments or call:

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Attn: Ms. Jeanine Holt

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Escalante Cattlemen's Association
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Honorable Lauree Dee Holley
Mayor of Cannonville
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Honorable Rick Bybee
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Tropic, UT 84776

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Salt Lake City, UT 84108

Ms. Ruth Frear
Escalante Wilderness Committee
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Sierra Club Southwest Office
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Mr. Michael Scott
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Ecological Services Branch
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Superintendent
Bryce Canyon National Park
Bryce Canyon, UT 84717

Superintendent
Glen Canyon National Recreation Area
Page, AZ 86040

APPENDIX E

United States Geological Survey (USGS) Technical Report - Escalante KGS

USGS Technical Report
The Escalante KGS

The Escalante Field was discovered by the Phillips Petroleum Company in 1960 (1 Escalante Unit SWNW 32-32S-3E). That well found CO_2 but had mechanical problems and was abandoned. A second well (2 Escalante Unit SESW 29-32S-3E) was drilled, also finding substantial amounts of CO_2 from 1,360 feet in the Shinarump Conglomerate down to 3,612 in the Cedar Mountain Formation. Due to the lack of a market, that well was abandoned November 1, 1961.

An undefined KGS determination was made, effective November 1, 1961, by letter dated March 7, 1962. The land included was conservatively placed on only the top of the anticline, although maps then available would have allowed a larger KGS.

Skyline Oil drilled a well farther down the anticline, completed September 19, 1969, (12-44 Escalante, SESE 12-33S-2E). Although the well was plugged as dry, our records indicate flows in excess of 10 MMCFPD of CO_2 from 3,450' to T.D. of 4,166', corresponding to the base of the Kaibab through the Coconino Formation. This indicates that the area overlying proven CO_2 reserves was much larger than the KGS even in 1969, but the KGS was not enlarged due to the lack of a market at that time.

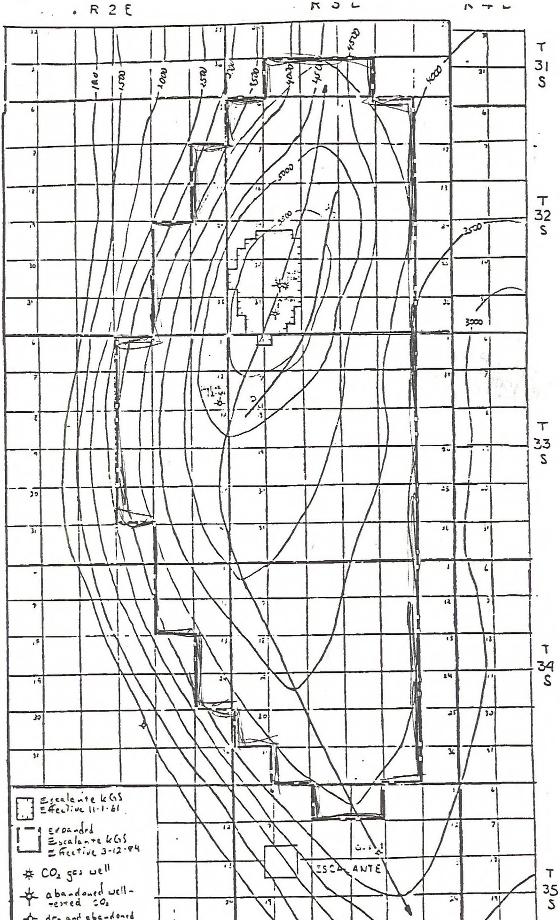
Another significant test was drilled by Gulf Oil in 1972 (1 Garfield, SESE 10-35S-3E), 2 miles east of the Town of Escalante. This well confirmed the Formations. There was no CO_2 or hydrocarbon, however, and the well was abandoned. The significance of the porosity is that it shows that the trap may extend that far, although it is not filled to that depth.

Porosity in the Kaibab is especially important as this limestone generally has small amounts of oil, but usually lacks sufficient porosity within which to accumulate commercial quantities of oil. The Upper Valley oil field produces large amounts of oil from the Kaibab. It had a very small CO_2-rich gas cap above the oil. As this field is directly downdip in a similar but smaller anticline (about 10 miles southwest of the Town of Escalante), it implies a good potential for oil in the Escalante anticline, located downdip from the gas, possibly in a ring.

The boundaries of the KGS expansion are based upon the surface expression of the anticline (see UGMS Map 30, Structure of the Escalante-Boulder area by C.C. McFall, 1971) and subsurface seismic work by Phillips Petroleum and Arco. The structure on the north end is covered by volcanics and is poorly known. The KGS is being drawn larger than the limits of closure on the Kaibab as I interpret it, due in part to the uncertainties of the structure on the north end. It also reflects the similarities with the Upper Valley field which produces from Kaibab porosity which extends down the axis of the Upper Valley anticline much further than the limits of the closed structure. The Gulf well shows that there is a similar porosity in the Escalante anticline. Although we will not know the actual limits of production until further drilling is done, we do know that a substantial portion is now proven. The boundaries are set on the area which is presumptively productive, and may require future modification.

The effective date of this KGS expansion, March 12, 1984, is the date of this review. This review reflects a new interest in the area, as reflected in the initial well drilled by Mid-Continent in the Death Hollow Unit. This well (1 Charger SESW 29-32S-3E) completed September 24, 1983, reconfirmed the nearby second test well of Phillips Petroleum. It tested 124 MMCFPD from approximately 1,100 feet of effective pay from 1,354 feet to 3,400 feet. The Death Hollow Unit was made too small because the lands south of the unit were not available for leasing; the geology of the unit proposal was not directly used for the KGS.

Allen Aigen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ESCALANTE
Escalante KGS Effective 11-1-61
Expanded Escalante KGS Effective 3-12-84
CO₂ gas well
abandoned well-tested CO₂
dry and abandoned
4500— Structure contour on top of Kaibab LS
Fault
axis of plunging anticline
probable limit of trap

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